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HANDBOOK

FOR THE

5-INCH B.L. HOWITZER (MARK I).
1901.

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5-INCH B.L. HOWITZER (MARK I).



1901.



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A.A.

Note.—This handbook has been corrected up to May, 1901; any alterations which may be suggested, should be forwarded to Chief Inspector, Royal Arsenal, Woolwich.

5-inch B.L. HOWITZER (Mark I).

DESCRIPTION.

(Plate I.)

Material	.. ..	Steel.
Weight	<div> <div> of howitzer, without fittings of breech fittings </div> <div> 8 cwt. 3 qr. 8 lb. 3 qr. 5 lb. </div> </div>	9 cwt. 2 qr. 13 lb.
Length, total	.. ..	49 inches.
Bore	<div> calibre length </div>	<div> 5 inches. 42 inches. </div>
Chamber	<div> diameter length capacity </div>	<div> 5.2 inches. 3.2 inches. 77 cubic inches. </div>
Rifling	<div> system length twist <div> grooves <div> number width depth </div> </div> </div>	<div> Polygroove, hook section. 36.8 inches. Uniform, 1 turn in 28 cal. 20 .6 of an inch. .05 of an inch. </div>
Venting	.. ..	Axial.
Obturation	.. ..	Pad.

The howitzer is made of steel, and consists of an A tube, over which is shrunk a B tube. Over the B tube is shrunk a jacket, the whole being secured longitudinally by means of shoulders on the A and B tubes, and a steel bush screwed into the B tube and jacket at the rear; the bush is also prepared for the reception of the breech-screw. A breech ring, for attaching the howitzer to the hydraulic buffers, is fitted over the rear portion of the breech bush and screwed to the jacket. The breech ring and bush are prevented from turning when in position, by a steel stud screwed through the breech ring, and partly into the bush and jacket, at the rear.

The breech ring is furnished with lugs for the attachment of the breech fittings.

Longitudinal projections formed on the sides of the jacket act as guides for the howitzer when in the cradle of the carriage; projections which serve as a plane for clinometer and seatings for the foresight brackets, respectively, are also formed on the upper side of the jacket, at the front end.

The chamber is cylindrical, terminating in front with a curved slope.

BREECH-CLOSING MECHANISM.

(Plate II.)

The breech is closed by a screw having three portions of the screw thread removed longitudinally, each one-sixth of the circumference. The interior of the howitzer, at the breech, being prepared in a similar manner, admits of the screw, when the raised portions are placed opposite the smooth surfaces in the howitzer, being pushed home and locked by the sixth of a turn.

The breech screw has hinged to it a cam lever, by means of which it is locked and unlocked; the cam portion of the lever (when the breech screw is locked) falls into a recess in the carrier ring, and so prevents any movement of the breech screw during firing. In lowering the cam lever after the breech screw is unlocked, the cam, acting upon the surface of the carrier ring, starts the first movement to the rear of the breech screw and obturator.

A "spring catch" is provided on the handle* of the breech screw for retaining the cam lever in the down position.

Encircling the rear end of the breech screw, and hinged to the breech ring, is a carrier ring which supports the screw when withdrawn.

The carrier ring is held to the howitzer, during the withdrawal of the breech screw, by means of a clip, fitted to the left side of the ring, engaging with a recess in a projection on the rear face of the breech ring.

A stop bolt, in the right side of the carrier ring, serves to prevent the breech screw being disengaged from the carrier ring when withdrawn; at the same time, the clip in the left side of the carrier ring is disengaged from the recess in the projection on the breech ring by means of a spiral spring, which forces the opposite end of the clip into a recess in the breech screw, thus securing the latter in the carrier ring. When in this position, the whole can be swung clear of the breech opening to admit of loading.

The carrier ring is retained in the loading position by a "spring latch."

If, when opening the breech, the carrier ring remains fast owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech mechanism wrench in the hole provided for the purpose on the left side of the breech.

OBTURATOR.

The system of obturation consists of a circular pad with protecting discs, fitting the mouth of the chamber, being placed between the mushroom head of the axial T vent and the inner face of the breech screw.

The pad, being slightly elastic, expands radially when compressed by the action of the gas generated by the fired charge, thus completing obturation.

To prevent play, owing to slightly varying dimensions of the pads, and their becoming compressed by firing, one to four (as required), thin adjusting discs of steel are placed between the rear protecting disc and the face of the breech screw.

* Nos. 2 to 7 howitzers have short handles. All subsequent issues have longer handles, so as to allow more room for the hand of the number working the breech screw.

FIRING MECHANISM.

The firing mechanism is designed for both "friction" and "electric" firing, with T friction and T electric tubes.

It consists of a steel axial vent, passing through the centre of the breech screw, having secured to its outer end a head for the reception of the T tube. The vent is retained in the breech screw by means of a spring catch. Fitted to the outer face of the breech screw, and encircling the vent head, is an actuating collar, worked by the cam lever and link, by means of which the T tube is automatically turned into the firing position, and the vent sealed, when the cam lever is lowered.

The T tube is automatically released from the vent and turned into the position for withdrawing, when the cam lever is raised, the tube being withdrawn by hand.

SIGHTING.

(Plate III.)

The howitzer is sighted upon both sides with cross-bar sights.

The tangent sights drop into sockets, and are set vertically. The vertical bars are of steel, rectangular in section, and are graduated on the rear face to 10 degrees, reading to 10 minutes, and on the right side with a yard scale to 2,000 yards for a full charge with a muzzle velocity of 782 feet seconds. Adjustment is affected by means of the "clamp tangent sight, D." The sights have bronze heads with clamping screws, and a steel horizontal crossbar, which slides within the head to the extent of 1° to the right, and 3° to the left, for deflection. The bar is provided with a sliding reversible leaf, having a notch for direct laying; this leaf is provided with a pointed sight for rough laying, and cross wires for fine laying, when used reversed. The bar is graduated from 0 to 6 right, for the right side, and 6 to 0 left, for the left side. The bars are reversible, being graduated upon one edge for the right side, and on the opposite edge for the left side of the piece, and are stamped accordingly.

The foresights consist of a steel stem with horizontal half crossbar (forged solid). The bar is fitted with a sliding reversible leaf, having a point, for use with the notch of the tangent sight, for direct laying, and a notch and eyehole for rough and fine laying, when used reversed. The sights slide into grooves prepared for their reception, in the foresight bracket, one of which is fitted, on each side of the clinometer plane, on the chase of the howitzer, and secured by means of a dovetail and fixing screw, and are retained in position by means of a spring catch. In the event of the spring of the catch becoming weak or broken, it will be replaced by a spare spring in the following manner:—To remove the catch, knock out the small rivet in the handle of the catch by means of a blunt punch, when the catch and spiral spring can be withdrawn. Insert new spring and replace the catch, for which purpose a new rivet will be required, the necessary wire being allowed spare for this purpose. To release the sights, the catch must first be raised.

The foresights are left and right, the horizontal half crossbars being graduated from 0 to 6 right, for the right side, and 6 to 0 left

for the left side, respectively, to correspond with the graduations on the crossbars of the tangent sights.

The method of using these sights is explained in the drill.

Abbreviated headings of the necessary information required for laying the piece are stencilled on the cradle and chase of the howitzer, as shown on Plate IV., which should be strictly adhered to in renewing the lettering.

DE BANGE OBTURATOR.

The obturator consists of a pad and pair of metal discs. The inner face of the breech screw is flat, and, between it and the mushroom head of the axial T vent, the pad and discs are arranged. The pad is made of asbestos, worked up with mutton suet to a proper consistency, and enclosed in a strong canvas cover; it is reduced to shape, and pressed in a hydraulic machine. The pad is enclosed between two tin discs, the outer angles of which are protected by steel rings. The howitzer is slightly coned at the seat of the obturator when pushed home, and the pad is provided with a corresponding taper to insure a good fit.

In putting the obturating pad and discs on to the axial vent, first place the front protecting disc, with its rounded side fitting the back of the mushroom head, then the pad with the side to the front which is curved to fit the front disc, the stitched side being to the rear; then the rear protecting disc, and in placing this, its flat side and bronze ring with which it is bushed, should be on the opposite side to the pad.

If correctly assembled, the whole should fit together compactly.

Should there be any play between the obturator and the face of the breech screw, one or more adjusting discs are placed behind the protecting disc.

The pads and discs issued on the breech screw with a howitzer have always been previously expanded in that howitzer, but the first time any other pad is used, it must be with a full charge and projectile.

Action.

When the breech screw is pushed into the howitzer, the obturator enters the chamber with perfect ease; on turning the breech screw, the obturating pad is pressed home into the coned seat in the howitzer by the travel of the screw. The bore is thus perfectly closed by a species of buffer in contact all round the circumference, while the mushroom head of the axial T vent receives the force of the gas on discharge. On firing the howitzer, the pressure acts on the mushroom head of the vent, and compresses the pad against the breech screw, causing it to expand laterally; from symmetry of form and position, this expansion must be radial to the axis and equal in every direction, and is sufficient to prevent the escape of the gas. On the pressure being removed, elasticity comes into play, and the obturator can be withdrawn from the cone by a straight pull, which can be given as soon as the screw is unlocked.

The pads are almost indestructible, except, perhaps, from the wear of opening and closing the breech; but, if the firing is rapid, they may get softened by heat; in this case, the pad should be changed and thrown into cold water for a time, when it will soon be restored

to good condition again. Spare pads are provided, and also steel adjusting discs, which should be inserted between the rear protecting disc and the face of the breech screw if the pad becomes compressed by firing, but in all cases the obturating pad and discs should turn freely on the breech screw.

The outer canvas of the obturating pad should be free from rents; small bruises likely to be removed by the pressure of firing are of no importance.

If the pad is not in good order, or there are too many adjusting discs behind the pad, stiffness in working the breech will probably result. The obturating pad should be rubbed occasionally with Russian tallow mixed with oil, or some other suitable lubricant; and the pad, with protecting discs, should be carefully handled to prevent them being indented or bruised.

The obturating pads and discs should be kept complete on the axial T vent in the howitzer, or in the boxes provided for the purpose, as there is a tendency of the pad to swell in the direction of its axis, which might cause difficulty in adjusting it on the breech screw.

TO REMOVE THE BREECH FITTINGS.

Before removing the fittings, the breech should be opened, the breech screw being swung into the loading position.

Axial T Vent and Obturator.

Press down the lever of the catch in the breech screw, which retains the axial T vent; the vent can then be withdrawn from the front of the breech screw, and the obturating pad and discs removed from the vent.

When the obturator is attached to the breech screw, the removal of the latter from the carrier ring should be done by two persons, as care is necessary to keep the "clip, retaining carrier ring" withdrawn clear of the breech screw before drawing the latter back, to avoid damaging the obturating pads and discs. The obturator should, however, always be detached, when possible, from the breech screw, before removing the latter from the carrier ring.

When the breech is open, the breech screw is held in the carrier ring by a stop bolt on the right, and by the retaining clip of the carrier ring on the left. By withdrawing the retaining clip from the breech screw, and holding it back, the breech screw can be moved forward and the stop bolt pushed out from behind; the breech screw can then be withdrawn from the carrier ring, the retaining clip being held back until the breech screw is clear of the ring.

Carrier Ring.

The carrier ring is attached to the breech by a hinge bolt and set screw; in order to remove the hinge bolt the set screw must be unscrewed clear of the hinge bolt, when the hinge bolt can be removed and the carrier ring withdrawn from the breech.

Clip, retaining Carrier Ring.

The retaining clip is actuated by a spiral spring, and retained in the carrier ring by means of a set screw; on the removal of the set screw, the clip and spiral spring can be withdrawn from the ring.

Cam Lever.

Take out the keep pin of the hinge bolt, when the latter can be removed, and the cam lever withdrawn.

Link, Actuating Collar.

Unscrew the axis pin of the link, and withdraw the link.

Collar, Actuating.

Turn the actuating collar until the indicating arrow on the collar corresponds with the arrow and the word "enter," engraved on the outer face of the breech screw, when the collar can be withdrawn.

Catch, Retaining Vent Axial.

To remove the catch, it must be pressed outwards by means of a piece of wood or a screwdriver, used as a lever in the interior of the breech screw, until the axis pin can be removed by means of a screwdriver, and the lever and catch with spiral spring withdrawn from the breech screw.

Catch, Retaining Cam Lever.

To remove the catch retaining cam lever of a certain number of the first issue of these howitzers, it is necessary first to remove the handle of the breech screw. This is done by taking out the two fixing screws of the handle, and withdrawing the latter from the breech screw. The catch, with lever and spiral spring, can then be removed from the handle by taking out the axis pin of the lever of the catch.

In howitzers of later manufacture, the handle is altered to afford more clearance for the hand of the number working the breech; and the breech screw is modified so as to admit of the catch retaining cam lever being removed without taking off the handle of the breech screw.

Latch, retaining Carrier Ring Open.

To remove the latch, press it down until the stop screw is at the bottom of the slot, then unscrew the stop screw and remove it, when the latch and spiral spring can be withdrawn.

TO RE-ASSEMBLE THE BREECH FITTINGS.

The converse of the above action takes place in re-assembling the fittings on the howitzer.

Care must be taken when placing the axial T vent and obturating pad and discs in the breech screw, to see that the indicating arrows engraved on the mushroom head of the axial T vent and the front end of the breech screw correspond, as it is in that position only that the catch in the breech screw for retaining the obturator will engage with the recess for its reception in the axial T vent.

In placing the actuating collar in position in the breech screw, the indicating arrow on the collar must correspond with the arrow and the word "enter" engraved on the outer face of the breech screw. When the collar is placed in the breech screw, it must then be turned

until the indicating arrow corresponds with another arrow with the words "engage link" on the breech screw, before the link of the actuating collar is placed in position.

CARE AND PRESERVATION OF B.L., 5-INCH HOWITZER AND FITTINGS.

See also "*Regulations for Magazines and the Preservation of War Matériel.*"

The breech fittings should be kept clean, oiled, or greased, and in good working order; all working surfaces must be well lubricated, the fittings being taken off sometimes for this purpose, especially after firing.

To lubricate the hinge bolt of the carrier ring without removing the fittings, the small screw on the top of the hinge bolt should be removed, and oil poured into the channel, taking care to replace the screw after oiling.

All fittings of the howitzer should be treated with care; violence and jerks should be avoided, and no unnecessary force should be employed.

The breech fittings should work easily, and be free from cracks and burrs; the latter can be removed by filing, but this must be done carefully, so as not to permanently damage the fittings. Should a crack be observed in a breech fitting, such fitting should be exchanged.

The threads of the breech screw should be free from burrs; should the screw not work easily, when the obturator has been detached, the defect may often be remedied by careful filing, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered by the canvas cover provided for this purpose to prevent dust and grit getting into the interstices of the breech fittings.

RIFLES, AIMING, M.H. CHAMBER, EWART, B.L. 5-INCH HOWITZER,

This apparatus is for use with the howitzer in imparting instruction in laying, and consists of the following parts:—

Rifle, aiming, M.H. chamber, Ewart—

*Band	..	..	..	..	bronze, with securing screw, collar, and keep pin.
Barrel, rifle	..	..	..	..	M.H. rifle barrel, with breech action and metal boss.
*Bracket	..	..	..	..	bronze, with fixing screw, key, and buffer.
Cord, ug	..	..	..	..	white line, tarred, 2 yards long, with two hooks.
Link, trigger	..	..	..	..	bronze, with fixing screw.

* Special to the howitzer.

Rifle, aiming, M.H. chamber, Ewart, *continued*—

Tube, 0.23-inch J. Morris, with breech piece,
bushes (movable and fixed),
set nut and leather washer;
rifles, aiming, M.H. chamber,
Elswick and Ewart (identical with tube, aiming, M.H. rifle).

Tube, 0.23-inch—

Brush, cleaning.

Key, M.H.

Rod, cleaning.

Method of Fitting, Adjusting, and Using the Apparatus.

The aiming rifle is fitted to the upper left side of the howitzer in the following manner:—

The band is placed over the exterior of the chase of the howitzer, and secured in position by a securing screw. The bracket is fitted to the upper part of the breech ring, and secured by a fixing screw. The distance between the inner faces of the bracket and band, when in position, is 27 inches. The muzzle of the rifle is passed through the hole in the arm projecting from the band, and the breech is placed in the socket in the bracket, and fastened with a key. A buffer spring, to lessen the recoil, fits into the socket in rear of the rifle. A hole is made at the rear end of the socket to facilitate the extraction of the buffer spring.

To adjust the rifle on the howitzer, the latter is laid on a mark and the rifle placed as near as possible parallel with the vertical plane of the piece, the band and bracket will then be firmly screwed up and a trial shot taken. Should the rifle be much out of line, the band will require to be slackened and moved round the chase in the required direction, but any slight error in line will be corrected by use of the deflection scale.

Elevation is obtained by means of the howitzer sights.

The rifle is fired by means of the firing cord, which is attached at one end, by means of a hook, to the loop of the trigger link, the other end of the cord being led round the removable clamp on the tangent sight, on the left hand side of the howitzer, to the firing number.

DESCRIPTIONS OF CARRIAGES, LIMBERS, AND WAGONS.

Carriage, field, B.L., 5-inch, howitzer, Mark I.
Limber, field, B.L., 5-inch, howitzer, Marks I, I*, and II.
Wagon, ammunition, B.L., 5-inch, howitzer, Marks I, I*, and II.
Wagon, forge, R.A., Mark III.
Limber, wagon, forge, R.A., Mark III*.
Wagon, store, R.A., Mark II.
Limber, wagon, store, R.A., Mark II*.
Wagon, ammunition and store, R.A., Marks II*, III, and IV.

CARRIAGE, FIELD, B.L., 5-INCH HOWITZER.

(Plates V and VI.)

The carriage consists of two side brackets, a trail eye, a cradle with hydraulic buffers and running out springs, elevating gear, shoe brakes, an axletree with 2nd-class arms, and two field wheels.

The side brackets are of steel plate, connected by top and bottom plates, transoms, and a trail eye. Bearings are formed in the upper parts of the brackets to take the trunnion arms of the cradle. The cradle is held in position by capsquares, which are hinged at their lower ends to the side brackets and secured at their upper ends by keys. A hole is cut in the right bracket for the lanyard to pass through when firing at extreme angles of elevation.

The trail eye is of wrought iron, the eye being fitted with a movable piece of hard steel.†

The cradle is in one casting, of steel, with trunnion arms to pivot it to the carriage brackets; it has an opening in the centre, recessed at each side in which the howitzer slides on recoil, and three cylindrical openings at each side, the centre one for a hydraulic buffer, and the upper and lower for running out springs. Each buffer consists of a steel tube, a piston with rod and controlling rod, a rear gland, and a front plug. The buffers are connected by a pipe to equalise the pressure. On the upper part of the cradle a plane is cut for the clinometer. A line of white paint is marked on the right side of the cradle (excepting those in field batteries) in such a position that when the line is opposite the bracket of the carriage, the howitzer will be in the loading position.

The hydraulic buffer tube, which is closed by the rear gland and the front plug, is formed at the rear into a stuffing box to take cotton packing. The piston rod, which is fitted with a metal ring round the periphery of the piston to prevent seizure, passes through the rear gland, and is connected to a projection on the breech ring of the howitzer. The upper and lower openings are each fitted to receive two running out springs, which are held under initial compression on a nut bolt; the rear end of each nut bolt is connected to a projection on the breech ring of the howitzer. The bore of the buffer tube is slightly tapered, so that the space around the periphery of the piston may form a varying orifice for the flow of the liquid; by this means an approximately constant pressure is maintained in the buffer throughout the stroke. The controlling rod of the piston fits into a recess formed in the front plug, so as to form a small hydraulic cushion, which prevents injury to the buffer by concussion caused by the return of the howitzer.

On firing, the piston rods, and nut bolts carrying springs, are drawn out of the cylinders, thus checking the recoil, and further compressing the running out springs; the energy thus stored up in the springs returns the howitzer to the firing position. The howitzer recoils about $5\frac{1}{2}$ inches in the cradle, during which the motion is gradually imparted to the whole structure, thus lessening the strain upon it due to firing.

The elevating gear is supported in brackets which are attached to the right side of the trail, and consists of a screw, handwheel with oscillating bearing and case, and a connecting lever, it is actuated by

† In future manufacture the trail and perch eyes and limber hooks will have a piece of hard steel worked in, instead of being fitted with movable steel pieces.

the handwheel, which transmits motion to the lever fixed to the cradle trunnion. When travelling, the handwheel is strapped to a staple on the trail. A clamping arrangement, also attached to the right side of the trail, is actuated by a lever, which moves a jamming screw and clamps an arc against the inner face of the carriage bracket, thus securing the cradle in any required position.

The brake consists of two brake or drag shoes, two drag shoe or brake shoe wire ropes, two sets of suspending chains, and two drag washers. The brake shoes (which are in one steel forging, with the sides splayed out to the front) are attached to the sides of the carriage, near the trail eye, by the wire ropes; the inner sides are connected by the suspending chains to the axletree, and when in use, the outer sides are connected with the drag washers by ram's-horn hooks.

In action, the shoes are placed on the ground, behind, and against the wheels, and the outer suspending chains are connected to the drag washers. On recoil, the wheels of the carriage run on the shoes, and ride on them during recoil. On running up, the wheels leave the shoes, which remain in position for the next recoil. When not in use, the shoes and outer chains are hung on hooks fixed to the rear of the axletree for the purpose. The brake shoe is turned over before hooking up, and the end link of the outer chain is slipped on the hook before the shoe is hooked up.

The brake shoes, which are also used as travelling drag shoes when required, are fitted with hardened steel soles, and designated "Shoe, drag, No. 8." When travelling, the shoes are hung on hooks fixed to the front of the axletree.

The axletree, which is 2nd Class, "C," No. 204, passes through octagonal holes in flanges which are attached to the side brackets; it is also connected to the side brackets by two tensile stays.

The wheels are 2nd Class,† "C," No. 35A, 5 feet in diameter, with steel nave, removable pipe box, and a 3-inch tire with rounded edges. The nave consists of two flanges of corrugated steel, which are connected by 14 bolts; the inner flange is fitted with a steel ring to strengthen it, and the outer flange with a metal centering ring; the pipe box passes through the flanges, and is secured by a nut, which is prevented from working loose by a spring fixed to the centering ring. A spanner (No. 93) is provided for removing the pipe box.

The carriage is furnished with locking plates, and fitted to carry a leather box (containing 1 claw hammer, 1 pair of pincers, 1 McMahon spanner, 1 breech brush, 2 hydraulic buffer spanners, No. 77 and 98, and 1 spanner filling plug, No. 79), a piasaba brush and stave-end, a traversing handspike No. 1, 2 aiming posts, a No. 9 oilcan, a fuze key in pocket, 2 water buckets, a tube pocket, a rimmer vent T, a rod vent, and a bit vent.

When in action, the tampeon is strapped to the right of the axletree.

The method of packing the above stores is shown on packing diagrams "A" and "B."

LIMBERS, FIELD, B.L., 5-INCH HOWITZER.

(Plates VII and VIII.)

The Mark I limber consists of a steel frame, a limber hook, a 2nd class axletree, a pole and pole bar, two swingletrees, an ammunition box, and two field wheels.

† In some cases No. 42 "C" wheel has been issued with these carriages.

The frame consists of four futchels, connected by front and diagonal stays; a platform and a footboard are fitted to the top, and draught hooks for the swingletrees to the front of the outer futchels; the footboard is raised by wood blocks 7 inches above the platform board.

A wrought-iron limber hook (No. 12), with movable steel,[†] is riveted to the inner futchels.

The axletree (No. 98) is a weldless steel tube with 2nd-class arms; it is secured by pins to flanges, which are attached to the futchels.

The pole draught consists of a No. 17 pole (12 feet 7 inches long), two No. 10a swingletrees (2 feet 4 inches long), a No. 2 supporting bar (3 feet 2½ inches long), all fitted for rapid release.

The ammunition box, which is of wood, is fitted with guard irons and opens at the rear. The rear of the box is in two parts, hinged to the top and bottom respectively. In opening the box, the upper part is moved upwards, and the lower part downwards; and the latter, when down, serves as a shelf for fuzeing shell when required, being prevented from falling below the horizontal position by means of stop plates and stops, which are attached to it, and to the sides of the box. The box is divided internally into four tiers of compartments, the three lower to carry, horizontally, a supply of lyddite common shell, and the upper to carry two cartouches (for 15 and 6 cartridges respectively), two fuze boxes No. 27 (containing fuzes and T tubes), and two wood trays (an upper and lower), marked "B" and "A" respectively, for gun fittings, &c. The shell and fuze boxes are held in position by metal discs.

The wheels are of the same pattern as those issued for the carriage.

The limber is fitted on the "off" side, at the rear, with a box to carry a "large" clinometer, and on the "near" side, with a plate to carry a No. 3 lubricating can,[‡] and a 3-lb. grease box. Fittings are provided on the "near" side of footboard for a steel box, arranged to carry a vent axial and a box for obturating pads and discs.

The limbers are also fitted to carry various stores as shown in packing diagram "A."

Half the limbers per battery will be fitted with loops for kicking straps.

The Mark I* differs from Mark I in a few manufacturing details only, except that the ammunition box is similar to Mark II.

Mark II is generally similar to Mark I, but the ammunition box differs in the interior being divided into three tiers, the two lower to carry, horizontally, 16 projectiles, and the upper to carry four cartridge boxes (each containing four cartridges), two fuze boxes, No. 30 (each containing 8 fuzes and 10 T tubes), and three wooden trays, marked A and B, for gun fittings, &c., and C for clinometers. The projectiles and the C tray are held in position by metal discs.

A board is attached by brackets to the front, and one is hinged to the rear, both flush with the top of the box, to afford seating space sufficient to carry four men when necessary. Foot rests are also provided at the rear.

The wheels are 2nd-class C, No. 42 or 35A.

The limber is fitted at the rear, on the "near" side with a plate to carry a No. 3 lubricating can[§] and a 3-lb. grease box; and on the footboard on the "near" side, for either a steel box to carry a vent

[†] See footnote †, page 11.

[‡] This lubricating can is issued for carriage limber only.

[§] Carriage limber.

axial, and box for obturating pads and discs, or box, lantern, bull's-eye.†

Fittings are also provided to carry various stores as shown in packing diagram B.

Half the limbers per battery will be fitted with loops for kicking straps.

AMMUNITION, WAGON, B.L., 5-INCH HOWITZER.

(Plates IX and X.)

The Mark I wagon consists of a steel frame, a hollow box perch fitted with trail eye, a travelling drag shoe, an ammunition box, a 2nd-class axletree, and two field wheels.

The frame consists of two flanged sides connected by channel stays; a footboard, raised by wood blocks, is fitted to the sides and perch in the front, and on the under side, at the rear; two wood boxes are attached by bands, each carrying a 14-lb. magazine grease box.

The perch, which is riveted to the frame and connected by two stays, is made of steel plate; it is fitted with a perch eye (No. 7), with movable steel‡ locking plates, and with a loop for the attachment of the drag shoe§ (No. 3) and chain (No. 18). The drag shoe, when not in use, is carried on the top of the perch, and secured by a leather strap.

The ammunition box is generally similar to that described for the limber, but differs slightly in the internal arrangement. The three lower tiers are fitted for lyddite common shell, and the top tier for two cartouches (each carrying 12 cartridges||), two No. 27 fuze boxes (containing fuzes and T tubes), and a wood tray for small stores.

The axletree, No. 38, is of weldless steel tube, with 2nd-class arms; it is held in flanges, which are secured to the sides and perch.

The wheels are the same pattern as those for the carriage and limber.

On the footboard, fittings are provided for carrying, on "near" side, a box for bull's-eye lantern.

The wagon is also fitted to carry various stores as shown in packing diagram "A."

The Mark I* differs from Mark I in a few manufacturing details only, except that the ammunition box is similar to Mark II.

The Mark II is generally similar to Mark I, but the ammunition box is in two portions and made to open both front and rear, the upper part of the lid opening upwards and the lower part downwards, the latter when down serving as a shelf for fuzing shell when required.

Both the front and rear portions of the box are internally divided into three tiers, the two lower to carry horizontally 16 projectiles, and the upper to carry four cartridge boxes (each containing four cartridges), two fuze boxes, No. 30 (each containing 8 fuzes and 10 T tubes), and a wooden tray for small stores. The projectiles and tray are held in position by metal discs.

The wheels are 2nd-class C No. 42 or 35a.

The wagon is also fitted to carry various stores as shown in packing diagram B.

† Wagon limber.

‡ See footnote †, page 11.

§ When wagons are fitted with tire brakes the drag shoe and chain will not be issued.

|| These will contain 15 cartridges, if required.

Dimensions, &c.

				Carriage and Limber.		Wagon and Limber.	
				ft.	in.	ft.	in.
Height to axis of howitzer .. ..	..	..	..	3	7	—	—
Length of {	carriage and	{ with howitzer ..	..	24	0½	—	—
	limber	{ without howitzer ..	..	23	6	—	—
of {	wagon and limber	..	..	—	—	22	5
	axletree ..	..	..	6	2	6	2
Length between axletrees .. ..	..	..	..	8	2½	7	2¾
Greatest projection beyond track of wheels ..	..	..	..	0	6	0	6
Maximum width .. ..	..	..	..	6	2	6	2
Wheels {	track ..	..	..	5	2	5	2
	diameter ..	..	..	5	0	5	0
Space required to turn in .. ..	..	..	..	32	6	29	0
Angle of {	trail ..	..	..	21½°	—	—	—
	leek ..	..	..	50°	—	65°	—
Upsetting angle .. ..	..	..	..	35°	—	34°	—
Elevation, maximum .. ..	..	..	..	45°	—	—	—
Depression .. ..	..	..	..	5°	—	—	—
Tonnage {	for shipment ..	..	..	6.487 tons	—	6.65 tons	—
	for transport in boats ..	..	..	12.44	—	12.27	—
Rectangular space occupied in boats ..	..	..	..	15' 3" x 6' 2"	—	15' x 6' 2"	—

Weights, &c.

(Packed, and with personal equipment, but without detachment.)

	Carriage and Limber Mark I.	Wagon and Limber Mark I.	Carriage and Limber Mark II.	Wagon and Limber Mark II.
	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Carriage and limber, with howitzer ...	46 2 8	—	43 1 8	—
Wagon and limber ...	—	46 1 8	—	48 1 26
Carriage { weight on two fore wheels	24 0 8	—	—	—
and limber { two hind ..	22 2 0	—	—	—
Wagon and { weight on two fore wheels	—	24 1 16	—	10 3 10†
limber { two hind ..	—	21 3 20	—	12 0 6†
Weight at end of pole, limbers ..	0 1 20	0 1 27	0 1 0†	0 1 0†
Pressure of perch on ground, wagon ..	—	1 3 0	—	1 0 20
" trail .. carriage ..	2 1 0	—	—	—
" { No. 35A ..	1 3 10	1 3 10	1 3 10	1 3 10
Wheel, { " 42 ..	2 0 16	2 0 16	2 0 16	2 0 16

WAGON, FORGE, R.A., MARK III.

LIMBER, WAGON, FORGE, R.A., MARK III*.

The wagon consists of a frame of angle steel, a steel perch, a tubular axletree, and two field wheels.

The frame is fitted to carry four wood boxes and a "Forge G.S., Mark II"; the boxes are secured in position by nib irons and thumb-screws; the two front boxes are fitted with drawers to carry smiths' and wheelers' tools, and the two sides are for carrying coal. The forge is placed between the coal boxes, and secured when travelling by leather straps and the tail board of the wagon; when required for

† Limber and wagon empty.

use the tail board is turned down, and the forge, which is provided with rollers, is run out on the tail board to facilitate removal. On the top of the front boxes are secured a block for the anvil, two lantern boxes (one for two distinguishing lanterns,† and one for two folding lanterns), one lifting jack, one grindstone, and an empty coal sack. To the top of the "off" coalbox eight farriers' aprons are strapped.

The perch is formed of steel plate, bent so as to form a tapering box girder, and fitted with a perch eye; it carries an anvil and a drag shoe, and has a plate attached for securing a vice when in use.‡ Two propsticks are fitted on the under side.

The axletree is tubular steel, 2nd class "C," No. 38.

The wagon is fitted with four bale hoops for a canvas cover. To the bale hoops four farriers' bags are strapped.

The limber is generally similar to the carriage limber, but is fitted with a limber box, internally arranged to carry cans, boxes and tins for the oil, soap, dubbing, &c., allowed for this equipment.

The wheels used with this wagon and limber are 2nd class "C," No. 36 or 42. In future manufacture No. 35a will be used.

Dimensions, &c.

Total length with pole	.. .. .	22 ft. 9 ins.
Maximum width	.. .. .	6 " 2 "
Length between axles	.. .. .	8 " 1 "
Wheels { track	.. .. .	5 " 2 "
{ diameter	.. .. .	5 " 0 "
Space required to turn in	.. .. .	29 " 4 "
Angle of lock	.. .. .	60°
Upsetting angle	.. .. .	30½°
Rectangular space occupied in boats	14 ft. 2 ins. x 6 ft. 2 ins. x 6 ft. 9 ins.	
Tonnage { for shipment	.. .. .	7.066 tons
{ for transport in boats..	.. .. .	14.93 "

Weights (approximate).

(Packed, including personal equipment.)

		cwt.	qr.	lb.
Wagon and limber	.. .. .	39	0	6
Wagon and { weight on two fore wheels	.. .. .	17	3	9
limber { " two hind "	.. .. .	21	0	25
Wagon (trail on ground)	.. .. .	23	0	12
Limber	.. .. .	15	3	22
Weight at end of pole	.. .. .	0	1	0
Pressure of perch on ground	.. .. .	2	2	15

WAGON, STORE, R.A., MARK II.

LIMBER, WAGON, STORE, R.A., MARK II*.

This wagon is similar to the forge wagon, Mark III, but the body is fitted with four wooden boxes, secured by nib irons and thumb-screws; the three front boxes are for carrying stores, and the rear box for stationery.

The limber is that described for the Mark III forge wagon, but the limber box differs in its internal fittings.

The wheels issued with this wagon and limber are 2nd class "C," No. 36, but in future manufacture No. 35a will be used.

† Distinguishing lanterns are carried in the ammunition columns only.

‡ See footnote §, page 14.

Dimensions, &c.

Total length, with pole	.. .. .	22 ft. 9 in.
Maximum width	.. .. .	7 " 2 "
Length between axles	.. .. .	7 " 9½ "
Wheels { track	.. .. .	5 " 2 "
{ diameter..	.. .. .	5 " 0 "
Space required to turn in	.. .. .	29 " 4 "
Angle of lock	.. .. .	60°
Upsetting angle (packed)	.. .. .	29½°
Rectangular space occupied in boats,	14 ft. 2 in. × 6 ft. 2 in. × 7 ft. 3 in.	
Tonnage { for shipment	.. .. .	8.127
{ transport in boats	.. .. .	16.089

Weights (approximate).

(†Packed, including personal equipment.)

		ewt.	qr.	lb.
Wagon and limber		35	2	2
Wagon and { weight on two fore wheels	.. .. .	15	2	2
limber { " two hind "	.. .. .	20	0	0
Wagon (perch on ground).. .. .		21	0	22
Limber		14	1	8
Weight at end of pole		0	1	11
Pressure of perch on ground		1	3	17

WAGON, AMMUNITION AND STORE, R.A., MARK II*.

(Plate XI.)

The body of this wagon consists of a framework formed by two sides, *a*, and two summers mortised into a front and rear carbed, *b*. This framework is strengthened by plates riveted on the inside; it is housed and bolted to a front bolster, *c*, a cross bar, *d*, and a rear bolster, *e*. In front and rear of the front bolster, front and rear wheel bolsters, *f*, are bolted to the summers, and to these three the upper wheel plate, *g*, is attached. The front bolster is shod with a friction plate, and is plated at the sides.

The body is supported over the hind axle upon two side stays of T-iron, and a cross stay of round iron. Each side stay rests in an axle block of oak upon the shoulder of the axletree, where it is secured by axletree staples, by a clip plate, and by the end of the cross stay, which latter serves as a coupling plate.

The frame is boarded over to form the bottom of the wagon; and movable sides, *A*, head-board, *B*, and tail-board, *C*, are fitted to it.

A locker is formed in front of the wagon body by a sliding partition. The lid of the locker is fitted with a raised box and driving seat, *k*, a back board, *l*, being hinged to it, and a foot board, *m*, to the head board of the wagon. A small locker, *n*, is also formed between the summers underneath the rear of the wagon.

These wagons are now fitted with cranked guard irons, and the driver's seat is made slightly higher for convenience in driving with long reins. The footboard is increased in length and width, and fitted with a long toe piece, and further supported by iron stays fitted to its under sides and to the front carbed.

The fore carriage of the wagon is formed of four futchels, *o*, housed in and bolted to a splinter bar, *p*, and a cross bar, *q*. An upper bolster, *r*, is bolted over, and an under bolster, *s*, beneath the centre of the futchels. A wheel plate is attached to the upper bolster,

† Without stationery.

to the cross bar, and to a small wheel bolster, *t*, placed in front. The upper bolster is shod with a friction plate, and both it and the lower bolster are strengthened by plates.

The frame of the fore carriage is supported over its axle in the same manner as the body over the hind axle.

The wagon is fitted for pole draught, which consists of a pole, bar supporting pole, and two swingletrees.

The body and fore carriages are connected by a main pin, which passes through bolster plates in the main bolsters, and is keyed beneath.

The footboard is of elm, the other boarding of yellow deal, and the remainder of the woodwork of the wagon of oak.

The fore wheels† are 2nd class B, No. 28, 3 feet 4 inches in diameter, the hind† 2nd class C, No. 35A, 5 feet in diameter. The axles are 2nd class.

The wagon is fitted to carry a spare fore wheel, entrenching tools, and a drag shoe† with chain, &c. Staples are fitted on the head board to carry the picketing gear in a bag secured by straps. A locking plate, *u*, is attached beneath the frame to prevent the fore wheel injuring the latter in wheeling on rough ground. Clip plates are attached to the floor (at the rear) of the wagon, to take a spare wheel arm, which will be supplied with such wagons as are allotted for carrying spare gun wheels.

The following articles belong to the wagon, namely, five bale hoops, *x*, a waterproof canvas cover with two lashing ropes, bar stay, three lashing ropes to secure the spare wheel, and two half-round grease tins.

The wagon is fitted with a tire brake which acts on the rear of the wheels and is applied by means of a handle at the rear of the wagon. A scotch roller is also provided.

The bale hoops are of ash, fitted with leather stops, and numbered from one upwards, commencing with the first hoop, a corresponding number being placed upon the wagon side at the upper staple for the bale hoop. The front hoop has also the register number of the wagon painted upon it.

The canvas cover is waterproofed, and has the register number of the wagon painted upon it.

The bar stay is of ash, to fit from side to side, and keeps the sides from spreading out when the wagon is packed and the tail board down.

The extreme load is 2 tons.

Certain wagons of this description when used for carrying baggage or tents, will be provided with raves on each side and a "cover, wagon, G.S., Mark IV."

Weight	.. .. .	20½ cwt.
Tonnage	{ for shipment	4.659 tons.
	{ for transport in boats	12.839 "
Rectangular space occupied in boats	.. .. .	11' 4" x 6' 3"
Upsetting angle	.. .. .	30°
Angle of lock	.. .. .	103°
Space required to turn in	.. .. .	23 ft. 7 ins.

A certain number of Mark III wagons have been made, but they

† Earlier issues of these wagons may be found with Nos. 33 (fore) and 32 or 39 (hind) wheels; these will be replaced as they become unserviceable by Nos. 28 and 35A.

differ from the Mark II* wagon in a few manufacturing details only.

WAGON, AMMUNITION AND STORE, R.A., MARK IV.

(Plate XI.)

The body of the wagon consists of a framework, formed by two sides, and a central summer, housed to a front bolster, centre crossbar, wheel plate bolsters, rear crossbar, and rear carbed. In front and rear of the front body bolster, front and rear wheel bolsters are bolted to the sides and summer, and to these three the wheel plate is attached.

The framework is boarded over to form the floor of the wagon, and fixed sides, partition for locker, and a tailboard are fitted to it. The side frames and summers are extended to the front, and arranged to support a footboard.

A locker is formed in the front part of the wagon; it is built up above the sides of the wagon, and fitted with a back rail so as to form a driving seat. Access to the locker is obtained from the front by means of a hinged flap, which is secured by a hasp and turn-buckle.

The body is supported over the hind axletree upon two springs which are attached, by lugs to the centre crossbar and sides, to the carbed and sides by scroll irons, and to the axletree by clips, staples, and coupling plates.

A spare gunwheel can be carried at the rear of the wagon on a wheel arm, and a spare forewheel can be carried lashed under the wagon. Clip plates are attached to the floor of the wagon (at the rear) for the bracket portion of the spare-wheel arm to fit into. The wheel arm will, however, only be issued for such wagons as are allotted to carry spare gun wheels.

The fore carriage consists of two futchels, main bolster, front and rear wheel plate bolsters, crossbars, and splinter bar. The bolsters and crossbars are housed on to the futchels, the former on top and the latter underneath. The upper part of the bolsters are shod with friction plates to work against the wheel plate on the body. The fore carriage is supported over its axle upon two springs, which are attached to the crossbar by lugs, and to the axletree by clips, staples and coupling plates. The splinter bar is fixed to the front of the futchels, and stayed to the front crossbar by round iron stays, the front ends of which are formed into draught hooks.

The wagon is fitted for pole draught, similar to the Mark II* wagon.

The body and fore carriage are connected by a main pin, which is passed through the summer and main bolsters, and is keyed beneath.

The fore wheels are 2nd Class "B," No. 28, 3 feet 4 inches in diameter, and the hind wheels, 2nd Class "C," No. 35A, 5 feet in diameter.

The fore axletree is 2nd Class B, and the hind axletree, 2nd Class C.

A tire brake is fitted to the wagon, which acts on the rear of the wheels, and is applied by means of a handle at the rear of the wagon. A scotch roller is also provided.

Staples are fitted for bale hoops, and lashing hooks for canvas cover.

Weight	10 cwt. 8 lbs.
Extreme load	40 " 0 "
Tonnage { for shipment	8.4 tons.
{ for transport in boats	14.665 tons.
Rectangular space occupied in boats	12 ft. 7 in. x 6 ft. 3 in.
Upsetting angle	33°
Space required to turn in	25 ft.

Certain wagons of this description when used for carrying baggage or tents will be supplied with raves on each side, and a "cover, wagon, G.S., Mark IV."

Note.—The stores carried in these wagons are laid down in the Tables of Equipment.

CARE AND PRESERVATION OF CARRIAGES, &c.†

See also "*Regulations for Magazines and the Preservation of War Matériel.*"

Hydraulic Buffers.

The full complement of liquid must be maintained in the buffer to prevent the liability of damage to the carriage when the howitzer is fired. To ensure this, always before firing is carried out, and periodically at other times, the cradle must be placed in the horizontal position, and the filling hole plugs removed to see if the oil shows at the filling holes; if not, more oil should be poured in, until it does show, and the plugs replaced.

Great care must be taken that no dust or gritty matter is poured in with the oil. If any leakage of oil takes place at the glands, or front plugs, they should be tightened; if this will not stop the leak, the packing must be renewed.

To Pack the Gland.—Fully depress the howitzer, unscrew the gland, and slip it along the piston rod; replace the defective packing with fresh material, which must be well saturated with Russian tallow before insertion, and replace the gland.

To Pack the Front Plug.—Empty the buffers, unscrew the plug, take out the defective packing, insert a new lead packing, replace the plug, and refill the buffers.

To Empty the Buffers.—Depress the howitzer and remove the front plugs, allowing the liquid to run into a clean can or other convenient vessel.

Total Contents, Buffers.—2½ pints.

To Insert New Running-out Springs.—Remove the nut bolt and tension bolt from the cradle, place the end of the nut bolt in the socket between the side brackets, unscrew the bolt, and take off the defective spring or springs. Insert a new spring or springs, placing each under an initial compression of 1.75 inches by means of the tension bolt, and replace the nut and springs in the cradle.

† For detailed instructions as to method of carrying out repairs, &c., see "*Handbook for Military Artificers.*"

AMMUNITION.

CARTRIDGES.

CARTRIDGE, B.L., 5-INCH HOWITZER, $11\frac{7}{8}$ -OZ. CORDITE, SIZE $3\frac{3}{4}$.

(Plates XII and XIII.)

The Mark I service cartridge consists of a core and three rings; the bag for the core is made of shalloon, in four pieces; the piece which covers the base has a shalloon disc sewn to it inside, the stitching passing round the circumference and across the centre, forming four compartments in each of which is placed 2 drams of R.F.G.² powder.

The core is made of a 2-ounce bundle of size $3\frac{3}{4}$ cordite forming the neck, round one end of which a ring of $1\frac{1}{4}$ -ounce cordite is placed, forming the base. The cordite of both neck and base is bound in several places by silk twist. Each ring consists of $2\frac{1}{8}$ ounces cordite, bound with shalloon. The three rings are fitted over the core, and secured to it by pieces of .35-inch silk braid, which are attached to the core, and passed through loops on the rings.

The Mark II cartridge differs from the Mark I in having the rings of cordite each enclosed in a shalloon bag, the ends of each bag being sewn together with silk twist; and in the igniter, which is formed by two concentric rings of sewing on the bottom so as to provide an annular recess for the R.F.G.² powder. The loops on the rings are omitted, one end of each of the two pieces of silk braid being passed between the core and the rings and tied to the other end outside the rings.

In future manufacture guncotton instead of powder will be used for priming.

Length (not to exceed)	.. ..	3.2 inches.
Diameter of rings (not to exceed)	.. ..	3.6 "
" base ( " )	.. ..	3.84 "

NOTES.—For use with *star shell* the core ($3\frac{1}{4}$ ounces) and one ring ($2\frac{1}{8}$ ounces), makes a good charge.

The *drill cartridge* is to be retained for instructional purposes only.

BLANK CARTRIDGE.

The cartridge is made of No. 1 class silk cloth, and sewn with two rows of silk sewing; the bottom is made circular in form, and secured to the lower end of the cartridge with silk sewing; 4 silk braids are threaded round the cartridge, each braid having a loop formed at one end for the purpose of tightening up and making a firm cartridge.

The cartridge is filled with 3 lbs. of blank L.G., R.L.G., or R.L.G.² powder, choked at the top, and secured with silk twist.

NOTE.—The tampeon is not to be taken out of the gun park, except when on the march.

PROJECTILES.

(Plates XIV to XIX.)

Nature.	Diameter.		Length.	Bursting Charge.		Weight, filled and fuzed.
	Body.	Band or Studs.		Nature.	Weight.	
	in.	in.	in.		lb. oz.	lb. oz.
Shells. common, lyddite, §	*cast iron, Mark II ...	4.96	5.11	15.0	P. and F.G. powder	3 3 50 0
	Mark I ...	4.96	5.11	15.0	Lyddite ...	4 14 50 10
	„ II, III.	4.96	5.11	18.0	Lyddite ...	9 15 50 0
	†Shrapnel, Mark I....	4.96	5.11	13.1	Pistol powder	0 4 50 0
	‡Star, Mark II. ...	4.96	5.11	15.0	R.F.G. „	0 2 30 11
	§Shot, case, Mark II. ...	4.97	5.11	14.9	—	— 50 0

COMMON SHELL.

The Mark I lyddite shell (*Plate XIV*) is made of forged steel. Near the base, a groove for a copper driving band is turned; four ridges project on the groove, and ten axial chisel marks are cut across the ridges to prevent the driving band turning on the shell.

The driving band is made of copper, and is pressed into the groove, round the shell.

The head of the shell is struck with a radius of two diameters, the point truncated, bored out, and screwed right hand, to receive the bush for the fuze. The bush is screwed on the outside below the head to fit the nose of the shell, and the interior is screwed to the G.S. fuze hole gauge.

The interior of the shell is varnished. The bursting charge consists of lyddite, with an exploder of uncompressed picric powder in a shalloon bag, but extending to within half-an-inch of the bottom of the shell.

The Mark II shell differs from Mark I in being 3 inches longer and having thinner walls, thus providing for a much larger bursting charge.

Mark III (*Plate XV*) differs from Mark II only in having the grooves for the driving band undercut.

With shells fitted with Mark II special fuze hole plugs kit plaisters will not be used.

The Mark II cast-iron common shell (*Plate XVI*) is similar in form to the Mark I lyddite shell, but is designed for a powder bursting charge. It differs from Mark I only in the grooves for the driving band being undercut. It is provided for practice only.

* For practice only.

† For practice till stock is exhausted.

‡ Supplied when specially ordered only.

§ The Mark VII lyddite shell for B.L. 5-inch gun may be used in the howitzer if howitzer shell are not available. See §10148 L. of C.

SHRAPNEL SHELL.

(Plate XVII.)

Mark I.—The body of the shell is made of forged steel, with a solid base. The shell is about 2 inches shorter than the Mark I common shell, but in general exterior form is otherwise similar.

In the base of the shell is placed a tin cup to contain the bursting charge. A steel disc is placed on the shoulder, in the bottom of the shell, above the tin cup, to support the weight of the metal balls; a hole is bored and screwed through the disc to receive the lower end of the central tube, the upper end of which is secured in the gunmetal head.

The shell is lined with brown paper, and contains 284 (16 to the lb.) and 84 (50 to the lb.) mixed metal balls, distributed as shown on the plate; the interstices between the balls are filled with resin. The top of the body is closed by a felt washer, for the head to set down on.

The head is of gunmetal, the lower end screws into the body, the inside being screwed to G.S. fuze hole gauge; the lower portion is tapped to receive a primer. The head is strengthened by six webs, and the spaces between them are fitted with wood blocks.

Mark II.—This shell differs from the *Mark I* in the head being made of mild steel instead of gunmetal, and having the lower end secured to the body by solder, rivets, and twisting pins in place of being screwed on.

These shells are supplied for practice only till stock is exhausted.

STAR SHELL.

(Plate XVIII.)

The body of the Mark I shell is made of forged steel, and has a recess in the base for the reception of a bursting charge of 2 drams of R.F.G.² powder, which is contained in a shalloon bag.

The head of the shell is fitted with a gunmetal fuze socket, tapped to the general service fuze hole gauge, and is attached to the body by six brass screws and six steel twisting screws. A wrought iron central tube, pierced with fire holes (to admit the flash to the priming of the stars) is screwed into the fuze socket, and into a disc of iron at the base of the shell.

The shell contains eight stars in two tiers, four in a tier, wood wedges being placed between the stars to prevent them from being crushed.

Mark II shell differs from Mark I only in the grooves for the driving band being undercut.

These shells are supplied when specially ordered only.

CASE SHOT.

(Plate XIX.)

The body is made of tin, in three pieces, lap jointed and soldered. The base is made of iron, and is fitted with a copper driving band, and a bent handle; the upper portion of the base is recessed to receive the driving band. The body has an inside lining of three iron segments, and contains about 185 2-oz. sand shot, the interstices

being filled with a mixture of equal quantities of clay and sand. A disc of iron or mild steel rests on top of the base inside the lining. The top is closed by a disc of iron or mild steel, which is secured by the upper edge of the body being spun over and soldered to it.

The base is secured to the body by the bottom of the latter being pressed into the recess for and being held by the driving band.

These shot are supplied when specially ordered only.

AUGMENTING STRIPS.

Augmenting strips are intended to be used with B.L. projectiles in cases when the rifling of the howitzer has, owing to erosion, become so worn that the howitzer ceases to properly rotate its projectiles. The strips are of copper, of even section throughout, and grooved on one side.

Method of Insertion.—The top cannellure in the driving band is undercut all round on both sides. The augmenting strip is then inserted in the cannellure, grooved side of strip inwards, and lightly hammered until the two tongues of metal formed by the groove on the inner side of the strip are dovetailed into the undercuts in the cannellure.

If the howitzer is very much worn, and one strip is found insufficient to impart the proper rotation, a second may be inserted in the lower cannellure in addition.

PREPARATION OF PROJECTILES.

(See also "*Regulations for Magazines, &c.*")

In cases where plugs are found to be tightly jammed in the shells, some means must be found to start the plugs other than with the "Key, fuze, universal." Any attempt to extract such plugs solely by means of the key may result in the latter being damaged.

FUZES.

(Plates XX to XXIII.)

Direct Action, with Cap. No. 1, Mark II.

Graze, No. 4, Mark I.

Time and Percussion, Middle, No. 54, Marks II and III.

Time, Sensitive, Middle, No. 24, Mark I.

DIRECT ACTION, WITH CAP, NO. 1.

(Plate XX.)

This fuze is intended to act on direct impact; it cannot be depended on to act on graze unless fired at angles of elevation of 10° and upwards.

It is made of gunmetal, turned all over, and screwed below the head to fit G.S. fuze hole. The interior is bored out at the lower end for the powder charge and closed with a screw base plug. A recess in the upper part of the fuze is charged with detonating com-

position, and the holes communicating with the magazine are filled with powder priming. The fuze is fitted with a steel needle, passing through and secured in a copper suspending disc, .032 inch thick. The lower part of the fuze is filled with pistol or R.F.G.² powder. A gun metal cap, having a T-shaped slot cut out in each side to fit over the projecting pins in the head of the fuze, is secured over the top.

On striking any object the suspending disc is driven in and the needle is forced against the detonating composition, thereby exploding the fuze.

Weight 7 $\frac{3}{4}$ ozs.

These fuzes are issued—5 in a tin cylinder.

GRAZE, No. 4.

The fuze is similar in external appearance to the "fuze, direct action, No. 1, Mark II," but is longer, has a solid head, and is not provided with a removable cap. It is fitted with a safety pin, which is inserted vertically through the head, and which must be removed at the time of loading.

The fuze can be screwed into the shell with the "key, fuze, universal."

Weight 11 ozs.

These fuzes are issued—1 in a tin cylinder.

TIME AND PERCUSSION, MIDDLE, No. 54.

(Plates XXI and XXII.)

Mark II.—The body is hollow, and has a stem on its upper side. Round the base of the stem an annular groove is cut, from which a hole is bored to the side of the body for the gas to escape through. The sides of the body are pierced with three fire holes; the top of the body is screwed to receive a hexagonal cap. The cap fits the hexagonal hole in the centre of the "key, fuze, universal." Between the cap and the dome fits a brass washer with feathers fitting into slots on the stem of the body; it is to prevent the dome from turning with the nut and altering the setting of the fuze when the cap is screwed tight.

The composition ring has an annular groove round it for the composition; a projection on the upper side contains the hammer with steel needle, suspended by a .022 inch wire, and a detonator under it for lighting the composition in the ring. The hammer is also secured by a safety pin passing under it, the hole in the ring left by its withdrawal being closed by a brass pellet with a spiral spring above it.

The composition ring is barrel shaped outside to facilitate the setting of the fuze. The ring is kept in position by three projections on the side, which fit closely round the stem of the body. An escape hole is bored through the top of the ring at the commencement of the composition, and three radial ones are bored through the inner side at equal distances round it.

The top and first radial holes are covered with paper, the two other radial holes with asbestos. The ring is graduated from 0 to

30, and reads as quarter units, and has an arrow head between the last graduation and the commencement to show the position of safety.

The body has an arrow head or black triangular mark on it for setting the fuze, opposite which is a hole from the surface to the percussion arrangement, filled with powder, for communicating the flash when the composition has burnt to it.

A small hole is made in the side to receive the pin in the semi-circular arm of the universal fuze key when screwing the fuze into the shell.

The fuze is stamped **T** on the ring close to the "time" safety pin,† and **P** on the body close to the "percussion" pin to distinguish them. If the fuze is required to act as a percussion fuze only, the **P** pin should be withdrawn, if as a time fuze only, the **T** pin, and if as a time and percussion fuze, both pins.

To set the time arrangement of the fuze, the nut is loosened with the "key, fuze, universal," and the ring moved round till the required graduation is opposite the arrow or black triangular mark on the body, the nut is then tightened, great care being taken to see that it is screwed down as tightly as possible.

The time of burning of the fuze at rest, when set at 30, or full length is 16 seconds.

The action of the time arrangement is that, on discharge, the hammer sets back, shearing the suspending wire, and fires the detonator, which lights the end of the ring of composition; this burns until the channel communicating with the lower part of the fuze is reached, when the flash passes down it and fires the detonator and magazine in the percussion arrangement.

Mark III differs from Mark II in the percussion arrangement being similar to that in the time and percussion fuze, Mark IV; the time ring having no escape holes beyond the two at the commencement of the fuze composition; and the loops of the eyes of the safety pins being formed of a double thickness of wire soldered together.

Weight 1 lb. 4 ozs.

These fuzes are issued—1 in a tin cylinder.

TIME, SENSITIVE, MIDDLE, No. 24.

(Plate XXIII.)

The fuze consists of the following parts:—

Body, with stem, lighting pellet, two retaining pellets, two spiral springs, needle, composition ring, dome, cap, two safety pins, base plug, and axial magazine filled with M.G.¹ powder.

All the parts are made of gunmetal.

The composition ring is graduated on its periphery from 0 to 30, and reads to quarter units. An **ψ** is stamped on the ring to show the safety point; and when this coincides with the **ψ** on the body the fuze is set at safety. The cap which screws on to the top of the stem, is made hexagonal to fit the "key, fuze, universal."

The fuze is set by loosening the screw cap *a* on the top of stem, by means of the "key, fuze, universal," and turning the dome and ring till the required graduation on the latter coincides with the arrow head on the body, then tighten the screw cap.

† In future manufacture the time safety pin will have a scarlet loop.

The safety pins are withdrawn at the moment of loading. On discharge the centrifugal action causes the retaining pellets to fly out, releasing the lighting pellet, which flies by centrifugal force against the needle, firing the detonator, which ignites the powder in the pellet and axial magazine, this latter lighting the quickmatch in the composition ring.

Weight 1 lb. 4 ozs.
Time of burning at rest, 14.6 to 15.8 seconds.

These fuzes are issued—1 in a tin cylinder.

NOTE.—For this equipment the foregoing fuzes are intended to be used as stated below:—

Direct action, with cap, No. 1, with common shell.

Graze, No. 4, with lyddite common shell.

Time and percussion, middle, No. 54, with shrapnel shell for practice.

Time, sensitive, middle, No. 24, with star shell, when specially ordered.

TUBES.

T FRICTION TUBES, MARKS II AND III.

(Plate XXIV.)

Mark II.—The form and general dimensions of the tube are shown on the plate, and consist of the following principal parts:—Body (a), head (b), ball (d), plug (e), friction wire (f).

The head is of gunmetal, the body of solid drawn brass, the ball of soft copper, and the friction bar of half round copper wire, twisted into a round bar, with a loop at one end and the other roughened. A hole in the side of the head of the tube over the friction wire is charged with about 2 grains of detonating composition, in the form of a paste, laid over the roughened part of the friction wire. A gut skin disc (g) is placed over the composition, and a shellaced cork plug (h) inserted over the disc, the hole being filled up flush with shellac cement. The body is charged with 8 grains of pistol powder, and is closed with a shellaced cork plug (i) covered with shellac cement, and a paper disc (k).

A brass pin (c) is inserted to prevent the body becoming unscrewed. The upper part of the body has a central perforation, which is enlarged in its lower part into a conical recess. The ball (d) is placed in this recess, and is retained therein by a screwed plug (e) pierced by three fire holes.

On the withdrawal of the friction bar the detonating composition is ignited, and the flash, passing down the perforation in the head and through the plug, fires the powder charge. The ball is driven upwards by the explosion and seals the tube. This, together with the mode in which the tube is held in the special vent employed with it, prevents the escape of gas.

The body is lacquered inside and outside.

Mark III differs from Mark II principally in the method of fixing the friction bar, which is suspended by a "shearing wire" at the base of the loop.

ark IV differs from Mark III in having the loop of the friction wire made larger, and the opening in the head correspondingly altered.

Total length of tubes 1.9 inch.

The tubes are issued in square tin boxes, 10 in a box. Both the top and the bottom of the box are removable, being secured by soldered bands, and the tubes are so arranged that five may be withdrawn from the top and five from the bottom.

NOTES.

Tubes, after firing, are to be returned to Woolwich to be repaired and refilled; they should be immersed in mineral oil within 24 hours after firing, for which purpose $\frac{1}{2}$ gallon of oil per 100 tubes—of which 2 ounces ($\frac{1}{10}$ th pint) would be used up in the treatment—is allowed.

In the event of a tube failing to ignite a charge, care should be taken in extracting the fired tube not to stand directly in rear of the howitzer, as the gas generated will cause the tube to fly out with some violence so soon as the T head is clear of the recess in the vent.

The vent channel sometimes becomes choked with residue from the cartridge. When this occurs the taper portion should be cleared with a "rimer, vent, T," sufficiently to allow of the insertion of a tube, which, when fired, will remove the rest of the obstruction.

A tube is not to be inserted in the vent till the breech is properly closed.

T FRICTION TUBE DRILL, MARK I. (Plate XXV.)

The drill tube is made of hardened steel, of the same external shape as the service tube. The head of the tube is grooved to receive a hardened steel spring, which is attached by a screw from the under side of the head. The end of the spring is bent down to nearly meet the bottom of the groove, which is raised to form a jaw, through which the hook of the lanyard can be drawn by a pull of about 50 lbs.

Total length 1.9 inch.

RANGE TABLE FOR 5-INCH B.L. HOWITZER, MARK I.

Based on Practice of 23rd and 30th April, 1895.

Charge,	{	weight, $3\frac{1}{2}$ oz. (CORE ONLY).	40185
		gravimetric density, $\frac{328.5}{0.084}$	7842
		nature, cordite, size $3\frac{3}{4}$.	
Projectile,	{	common or shrapnel shell.	
		weight, 50 lb.	
			Muzzle velocity, 402 f.s.
			Nature of mounting, travelling, field.

Remaining velocity.	Slope of descent.	5 minutes' elevation or deflection alters		Deflection for drift.	ELEVATION.	RANGE.	50 per cent. of rounds should fall in			Time of flight.
		Range.	Laterally or vertically.				Length.	Breadth.	Height.	
f.s.	1 in	yards.	yards.	° '	° '	yards.	yards.	yard.	yards.	secs.
399	32	5	0.14	0 1	1 39	100	5.5	0.06	0.17	0.75
396	16	5	0.29	0 3	3 15	200	6.0	0.12	0.37	1.53
393	10	5	0.43	0 4	4 58	300	6.5	0.25	0.65	2.28
390	8	5	0.58	0 6	6 41	400	7.0	0.39	0.88	3.10
387	6	5	0.72	0 9	8 30	500	7.5	0.46	1.25	3.87
384	5	4	0.87	0 12	10 26	600	8.0	0.54	1.00	4.70
381	4	4	1.01	0 16	12 24	700	8.8	0.58	2.20	5.56
377	3	4	1.16	0 20	14 27	800	9.7	0.62	2.93	6.43
373	3	4	1.31	0 26	16 35	900	10.5	0.66	3.50	7.32
369	3	4	1.45	0 32	18 49	1000	11.4	0.69	4.50	8.25
365	2	3	1.60	0 39	21 19	1100	12.4	0.71	5.00	9.20
362	2	3	1.74	0 46	24 9	1200	13.5	0.73	6.75	10.28
360	2	3	1.89	0 56	27 24	1300	15.5	0.74	11.85	11.51
359	1	2	2.03	1 9	31 36	1400	18.1	0.74	18.10	13.1
359	1	1	2.18	1 30	38 30	1500	23.4	0.78	...	15.70

RANGE TABLE FOR 5-INCH B.L. HOWITZER, MARK I.

Based on Practice of 23rd and 30th April, 1895.

Charge,	{	weight, $6\frac{1}{8}$ oz. (CORE and 1 RING).	Muzzle velocity, 556 f.s.
		gravimetric density, $\frac{195.2}{0.142}$	
		nature, cordite, size 3 $\frac{1}{2}$.	
Projectile,	{	common or shrapnel shell.	Nature of mounting, travelling, field.
		weight, 50 lb.	

Remaining velocity.	Slope of descent.	5 minutes' elevation or deflection alters		Deflection for drift.	ELEVATION.	RANGE.	50 per cent. of rounds should fall in			Time of flight.
		Range.	Laterally or vertically.				Length.	Breadth.	Height.	
f.s.	1 in	yards.	yards.	° /	° /	yards.	yards.	yards.	yards.	secs.
552	60	9	0.14	0 1	0 55	100	0.5	0.20	...	0.56
548	30	9	0.29	0 2	1 51	200	1.0	0.25	0.03	1.25
544	20	9	0.43	0 4	2 46	300	1.5	0.32	0.07	1.72
539	15	9	0.58	0 6	3 43	400	2.0	0.38	0.13	2.30
534	12	9	0.72	0 8	4 39	500	2.5	0.44	0.21	2.87
529	10	8	0.87	0 10	5 36	600	3.6	0.50	0.36	3.48
524	8	8	1.01	0 12	6 36	700	4.6	0.56	0.58	4.07
519	7	8	1.16	0 14	7 36	800	5.6	0.61	1.06	4.78
514	6	8	1.31	0 16	8 34	900	6.7	0.68	1.62	5.30
509	5	8	1.45	0 18	9 44	1000	7.8	0.76	2.18	5.94
504	5	7	1.60	0 20	10 50	1100	8.9	0.84	2.83	6.58
499	4	7	1.74	0 22	12 00	1200	10.0	0.95	3.48	7.24
495	4	7	1.89	0 24	13 10	1300	11.3	1.04	4.25	7.89
491	3	7	2.03	0 27	14 27	1400	12.6	1.27	5.02	8.56
487	3	6	2.18	0 30	15 43	1500	14.2	1.40	5.85	9.24
483	3	6	2.32	0 33	17 06	1600	16.0	1.63	6.88	9.91
479	3	6	2.47	0 36	18 29	1700	17.9	1.89	8.13	10.58
475	2	6	2.61	0 39	19 56	1800	20.2	2.18	9.38	11.31
471	2	5	2.76	0 43	21 23	1900	22.9	2.50	11.07	12.06
467	2	5	2.91	0 46	22 54	2000	25.8	2.84	12.77	12.85
464	2	5	3.05	0 51	24 30	2100	29.0	3.21	15.10	13.71
462	2	4	3.21	0 56	26 12	2200	32.8	3.63	...	14.67
461	1	4	3.34	1 0	28 10	2300	38.1	4.06	...	15.76
460	1	3	3.49	1 6	30 29	2400	45.4	4.56	...	17.12
458	1	2	3.63	1 20	33 38	2500	46.5	4.60	...	18.89
458	1	1	3.78	1 49	38 44	2600	47.6	4.64	...	21.32

RANGE TABLE FOR 5-INCH B.L. HOWITZER, MARK I.

Based on Practice of 22nd April and 9th May, 1895.

Charge,	{ weight, $8\frac{1}{2}$ oz. (CORE and 2 RINGS). gravimetric density, $\frac{138.8}{0.199}$ nature, cordite, size 3 $\frac{1}{2}$.	Muzzle velocity, 670 f.s.
Projectile,	{ common or shrapnel shell. weight, 50 lb.	Nature of mounting, travelling, field.

Remaining velocity. f.s.	Slope of descent. 1 in	5 minutes' elevation or deflection alters		Deflection for drift. ° ' "	ELEVATION. ° ' "	RANGE. yards.	50 per cent. of rounds should fall in			Time of flight. secs.
		Range. yards.	Laterally or vertically. yards.				Length. yards.	Breadth. yards.	Height. yards.	
665	84	12	0.14	0 1	0 40	100	1.8	0.09	0.02	0.47
660	42	12	0.29	0 2	1 20	200	2.7	0.16	0.06	0.99
656	29	12	0.43	0 3	1 57	300	3.4	0.23	0.12	1.46
652	23	12	0.58	0 3	2 36	400	4.0	0.30	0.18	1.95
648	17	12	0.72	0 4	3 14	500	4.6	0.37	0.27	2.42
644	14	12	0.87	0 4	3 52	600	5.3	0.44	0.38	2.91
640	12	12	1.01	0 5	4 31	700	5.8	0.51	0.48	3.40
636	11	12	1.16	0 6	5 10	800	6.4	0.58	0.58	3.87
632	9	12	1.31	0 7	5 49	900	7.1	0.68	0.80	4.35
628	8	12	1.45	0 9	6 31	1000	7.8	0.78	1.06	4.85
624	7	12	1.60	0 10	7 12	1100	8.6	0.84	1.37	5.34
620	7	12	1.74	0 12	7 55	1200	9.4	1.00	1.62	5.84
616	6	12	1.89	0 14	8 38	1300	10.0	1.10	1.91	6.34
612	5	11	2.03	0 16	9 22	1400	10.6	1.20	2.20	6.86
608	5	11	2.18	0 17	10 8	1500	11.3	1.30	2.52	7.35
605	4	11	2.32	0 19	10 55	1600	12.0	1.40	2.84	7.90
601	4	10	2.47	0 20	11 42	1700	12.6	1.50	3.20	8.44
597	4	10	2.61	0 21	12 33	1800	13.2	1.60	3.56	9.01
593	3	10	2.76	0 23	13 24	1900	13.8	1.69	3.96	9.59
589	3	9	2.91	0 25	14 18	2000	14.4	1.78	4.36	10.18
585	3	9	3.05	0 26	15 14	2100	14.8	1.87	4.81	10.82
581	3	9	3.21	0 28	16 14	2200	15.2	1.96	5.32	11.44
577	3	8	3.34	0 30	17 16	2300	15.6	2.04	5.90	12.06
573	2	8	3.49	0 33	18 20	2400	16.0	2.12	6.48	12.71
569	2	8	3.63	0 35	19 26	2500	16.4	2.20	7.17	13.37
565	2	7	3.78	0 37	20 34	2600	16.8	2.28	7.86	14.07
561	2	7	3.92	0 39	21 44	2700	17.2	2.35	8.72	14.78
549	2	7	4.07	0 41	23 00	2800	17.6	2.42	9.58	15.57
541	2	6	4.21	0 44	24 21	2900	18.0	2.50	10.72	16.40
533	2	6	4.36	0 46	25 43	3000	18.4	2.58	11.87	17.29
525	1	5	4.51	0 49	27 13	3100	18.8	2.65	13.38	18.26
517	1	5	4.65	0 52	28 53	3200	19.2	2.72	14.90	19.31
509	1	4	4.80	0 55	30 55	3300	19.7	2.79	16.83	20.50
514	1	3	4.94	0 58	33 18	3400	20.2	2.87	...	21.92
519	1	2	5.09	1 4	36 11	3500	22.0	2.96	...	23.50
524	1	2	5.23	1 30	39 32	3600	23.8	3.05	...	25.33

RANGE TABLE FOR 5-INCH B.L. HOWITZER, MARK I.

Based on Practice of 22nd April and 10th May, 1895.

Charge, { Weight, 11 $\frac{1}{4}$ oz. (CORE and 3 RINGS).
gravimetric density, $\frac{107.7}{0.257}$
nature, cordite, size 3 $\frac{1}{2}$.
Muzzle velocity, 782 f.s.
Nature of mounting, travelling, field.
Projectile, { common or shrapnel shell.
weight, 50 lb.

Remaining velocity. f.s.	Slope of descent. 1 in	5 minutes' elevation or deflection alters		Deflection for drift.	ELEVATION.	RANGE.	FUZE SCALE for middle T. and P. fuze, Marks I* or II.	50 per cent. of rounds should fall in			Time of flight. secs.
		Range.	Laterally or vertically.					Length.	Breadth.	Height.	
yards.	yards.	yards.	yards.	yards.	yards.	yards.	yards.	yards.	yards.	yards.	secs.
776	122	18	0.14	...	0 27	100	1	1.9	0.04	...	0.41
770	60	18	0.29	0 1	0 55	200	1	2.8	0.09	0.04	0.84
764	41	18	0.43	0 1	1 22	300	2	3.7	0.11	0.09	1.24
758	31	18	0.58	0 2	1 50	400	3	4.5	0.14	0.14	1.63
752	24	18	0.72	0 2	2 17	500	3	5.3	0.19	0.22	2.03
746	20	18	0.87	0 3	2 45	600	4	6.2	0.24	0.31	2.50
740	17	17	1.01	0 4	3 14	700	4	6.9	0.30	0.41	2.93
735	15	17	1.16	0 5	3 42	800	5	7.6	0.36	0.51	3.35
730	13	16	1.31	0 6	4 10	900	6	8.5	0.42	0.65	3.76
725	11	16	1.45	0 7	4 41	1000	7	9.4	0.48	0.86	4.17
720	10	15	1.60	0 8	5 11	1100	7	10.2	0.58	1.08	4.59
715	9	15	1.74	0 10	5 44	1200	8	11.0	0.63	1.28	5.04
710	8	15	1.89	0 11	6 15	1300	9	11.9	0.82	1.51	5.46
705	7	15	2.03	0 12	6 48	1400	10	12.8	0.96	1.74	5.90
700	7	15	2.18	0 13	7 22	1500	11	13.6	1.10	2.01	6.33
695	6	15	2.32	0 14	7 55	1600	12	14.4	1.2	2.28	6.77
690	6	14	2.47	0 15	8 29	1700	13	15.3	1.39	2.61	7.22
685	5	14	2.61	0 16	9 04	1800	13	16.2	1.54	2.94	7.67
680	5	14	2.76	0 17	9 38	1900	14	17.1	1.69	3.33	8.14
675	5	14	2.91	0 18	10 12	2000	15	18.0	1.84	3.73	8.59
671	4	14	3.05	0 19	10 46	2100	16	18.8	2.00	4.18	9.07
667	4	13	3.21	0 20	11 23	2200	17	19.6	2.16	4.64	9.56
662	4	13	3.34	0 20	12 00	2300	18	20.5	2.33	5.15	10.06
657	4	13	3.49	0 21	12 38	2400	19	21.4	2.50	5.66	10.57
652	4	13	3.63	0 22	13 15	2500	20	22.4	2.68	6.27	11.08
648	3	12	3.78	0 23	13 54	2600	21	23.4	2.86	6.88	11.62
644	3	12	3.92	0 24	14 34	2700	22	24.4	3.04	7.63	12.13
639	3	12	4.07	0 25	15 17	2800	23	25.4	3.22	8.38	12.68
634	3	11	4.21	0 26	16 01	2900	24	26.5	3.43	9.32	13.23
629	3	11	4.36	0 27	16 46	3000	25	27.6	3.64	10.26	13.78
625	3	10	4.51	0 28	17 34	3100	26	28.6	3.85	11.23	14.33
622	2	10	4.65	0 29	18 22	3200	27	29.6	4.06	12.20	14.88
618	2	10	4.80	0 30	19 13	3300	28	30.7	4.28	13.26	15.45
615	2	10	4.94	0 32	20 04	3400	29	31.8	4.50	14.52	16.02
611	2	10	5.09	0 34	20 54	3500	...	32.9	4.74	15.66	16.61
608	2	10	5.23	0 36	21 46	3600	...	34.0	4.98	17.02	17.20
604	2	9	5.38	0 38	22 37	3700	...	35.2	5.22	...	17.84
601	2	9	5.52	0 40	23 31	3800	...	36.4	5.46	...	18.49
598	2	9	5.67	0 43	24 28	3900	...	37.5	5.72	...	19.16
595	2	8	5.81	0 47	25 25	4000	...	38.6	5.98	...	19.88
592	1	7	5.96	0 51	26 27	4100	...	39.7	6.24	...	20.63
590	1	7	6.11	0 55	27 35	4200	...	40.8	6.50	...	21.47
588	1	6	6.25	0 59	28 46	4300	...	42.1	6.77	...	22.34
586	1	5	6.40	1 3	30 06	4400	...	43.4	7.04	...	23.32
589	1	4	6.54	1 10	31 38	4500	...	44.5	7.37	...	24.48
592	1	3	6.69	1 19	33 30	4600	...	45.6	7.60	...	25.78
600	9	3	6.83	1 27	35 52	4700	...	46.7	7.88	...	27.29
607	8	3	6.98	1 38	38 46	4800	...	47.8	8.16	...	29.07
615	7	1	7.13	1 46	42 24	4900	...	49.1	8.98	...	31.08

MEKOMETERS.

For information concerning Mekometers, *see* the Mekometer Handbook, also "Regulations for Magazines and the Preservation of War Matériel."

SECTION DRILL

ARRANGEMENT.

Formation and movements of the detachment.

TO TELL OFF,

Position of "Detachment Rear."
 To form detachment rear when unlimbered.
 To take post from detachment rear when unlimbered.
 Position of the order of march.
 To form the order of march from detachment rear.
 To form detachment rear from the order of march.
 Mounted.
 To mount.
 To dismount.
 To move the howitzer.

PREPARATION FOR ACTION.

ACTION.

TO LOAD.

DUTIES.

Ammunition supply.
 Casualties.
 Signals.
 To fire.
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 To stand fast.
 To cease firing.
 To limber up.

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TO PICK UP THE LINE OF FIRE.

One aiming post.
 Firing from behind cover and
 at concealed targets.
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DESCRIPTION AND USE OF CROSS-BAR SIGHTS.

DISABLED ORDNANCE.

To replace a damaged wheel.

INSTRUCTIONS FOR USING A CLINO-METER.

DESCRIPTION OF FIELD PLOTTER.

METHOD OF DRILLING RECRUITS.

SECTION DRILL.

The following paragraphs give the duties of the detachments at the section commander's orders.

Battery drill and the supply of ammunition will be carried out on the general principles laid down in Field Artillery Drill.

Single detachments should be accustomed to drill as if forming part of a section, and the instructor should always use the orders given for the section commander.

As a rule detachments will be drilled at "wagon supply," "limber supply" being the exception. The wagon will be placed 3 yards in rear of one of the howitzers before commencing drill.

In all words of command the word "gun" will be used instead of "howitzer," for the sake of brevity.

FORMATION AND MOVEMENTS OF THE DETACHMENTS.

The detachment consists of 9 men, who fall in two deep one pace between the ranks, **1** on the right of the front rank.

To TELL OFF.

Section Commander.	1.
— Section, Tell off.	

At the order from the section commander—

1 numbers himself **1**; the right-hand man of the rear rank numbers **2**; the right-hand man of the front rank numbers **3**; the second man from the right of the rear rank **4**; his front rank man **5**; and so on.

POSITION OF DETACHMENT REAR.

Formed as above, 3 yards in rear of the howitzer wheels. **1** covering the off wheel.

To FORM DETACHMENT REAR WHEN UNLIMBERED.

Section Commander.	1.
— Section, Detachment rear.	No. —, Double March.

At the order from the section commander—

1 doubles to his place three yards in rear of the right wheel and gives the order, "Double March."

At the order from 1—

The remainder double into their places on the left of **1** by the shortest way and halt.

TO TAKE POST FROM DETACHMENT REAR WHEN UNLIMBERED.

<i>Section Commander.</i>	<u>1.</u>
— Section, Take post.	No. —, Double March.

At the order from 1—

The remainder double to their places.

POSITION OF THE ORDER OF MARCH.

1 on his horse. At dismounted drill he will place himself 2 yards from the point of the pole on the near side.
 4 and 5 in line with the axletree of howitzer limber.
 2 and 3 in line with the centre of the trail.
 6 and 7 in line with the axletree of the wagon limber.
 8 and 9 in line with the axletree of the wagon body.
 All covering from the front, and one yard from the wheels
 Even numbers on the near side, odd on the off.

TO FORM THE ORDER OF MARCH FROM DETACHMENT REAR.

<i>Section Commander.</i>	<u>1.</u>
— Section, Form the Order of March.	No. —, Double March.

At the order from the section commander—

1 doubles to his place and gives the order, "Double March."

At the order from 1—

The remainder double into their places by the shortest way and halt.

TO FORM DETACHMENT REAR FROM THE ORDER OF MARCH.

<i>Section Commander.</i>	<u>1.</u>
— Section, Detachment rear.	No. —, Double March.

At the order from the section commander—

1 doubles to his place and gives the order, "Double March."

At the order from 1—

The remainder double into their places by the shortest way and halt.

MOUNTED.

Detachments are only mounted on emergency on service.

For ceremonial parades, both for the walk and trot past, there will only be two men on each limber, both facing the front; and similarly two on each wagon body.

1 on his horse.

2, 3, 4, and 5 on the howitzer limber, 4 and 5 in front.

6 and 7 on the wagon limber.

8 and 9 on the wagon body.

At the order "Attention," they sit upright, holding the handstraps with both hands.

At the order "March," they take hold of the guard irons with their outward hands, and when going over rough ground slightly raise themselves so as to avoid being jolted.

At the order "Sit at ease," they drop the handstraps and sit well back, both hands between the thighs.

6 may, on an emergency on service, ride between 4 and 5 when going into action. In this case he will mount and dismount by the front of the limber on the near side,

To MOUNT.

<p style="text-align: center;"><i>Section Commander.</i></p> <hr style="width: 20%; margin: auto;"/> <p>—Section, Detachments pre- pare to mount. Mount.</p>		<p><u>1.</u></p>
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At the order, "Detachments prepare to mount," from the section commander, they double to their places at the carriages, 2 and 3 take hold of the guard irons, 2 with his left hand, 3 with his right, placing the inner foot on the trail; 4 and 6, and 5 and 7 take hold of the guard irons, 4 and 6 with their right hands, 5 and 7 with their left, placing the inner foot on a spoke of the wheel. 8 and 9 take hold of the guard irons, 8 with his right hand, 9 with his left, placing the inner foot on the perch.

At the order, "Mount," the whole spring into their places.

To DISMOUNT.

<p style="text-align: center;"><i>Section Commander.</i></p> <hr style="width: 20%; margin: auto;"/> <p>—Section, Detachments prepare to dismount. Dismount.</p>		<p><u>1.</u></p>
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At the order, "Detachments prepare to dismount," from the section commander, the men on the carriages stand up, keeping their outward hands on the guard irons.

At the order, "Dismount," the whole jump off and form the order of march.

To move the Howitzer.

If it is required to move the howitzer and wagon a short distance to represent an advance, this may be done with or without drag ropes.

To MOVE THE HOWITZER WITH DRAG ROPES.

<p style="text-align: center;"><i>Section Commander.</i></p> <hr style="width: 20%; margin: auto;"/> <p>—Section, with drag ropes prepare to advance.</p>		<p><u>No. 1.</u></p>
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At the order from the section commander—

2 and 3 hook the drag ropes to the carriage wheel washers, the two highest numbers go to the pole, and the remainder man the ropes.

TO MOVE THE HOWITZER WITHOUT DRAG ROPES.

<i>Section Commander.</i>	No. 1.
— Section, Without drag ropes	—
prepare to advance.	

At the order from the section commander—

2 and 3 push between the muzzle and wheels, 4 and 5 man the carriage wheels, the two highest numbers go to the pole, and the remainder assist.

The wagon is moved in a similar manner as soon as the howitzer has been placed in position, unless there are a sufficient number of men on parade to move the carriages simultaneously.

PREPARATION FOR ACTION.

<i>Section Commander.</i>	1.
— Section, Prepare for Action.	—

At the order from the section commander—

The section commander provides himself with the small clinometer.

1 sees that the bore is clear, superintends the other numbers, provides himself with a piece of chalk, and mounts when his subdivision is ready.

2 fills the tube pocket and examines the brake.

3 removes the breech cover and straps it to the top transom of the carriage, examines the breech fittings, sees that the fuze key is in the pocket on the tensile stay, and examines the brake.

4 examines the sights, elevating gear, and aiming posts, and provides himself with the clinometer and laying cord. If both sets of sights are in the howitzer he replaces the left set in the limber. The right sights will always be used unless otherwise ordered.

5 sees that the fuze keys are in the pockets, and examines the limber box.

6, 7, 8, and 9 see that the fuze keys are in their pockets, and examine the wagon boxes.

The lanyards of all fuze keys should be attached to the leather loop inside their pockets.

The men detailed to "Examine" the various ammunition boxes see that they are properly filled, also that the lids open easily, and the locks are in good order. Any deficiencies in the limber or wagon boxes are filled up from the 2nd line of wagons under the direction of 1.

On the completion of the above, the detachment resume their places.

ACTION.

<i>Section Commander.</i>	1.
— Section, Action Front.	No.—, Action Front.

At the order from 1—

3 unkeys, and, with 2, lifts the trail; when the trail is clear of the hook 3 gives "limber drive on."

2 and 3 carry the trail round half a circle to the left (2 shifting round the trail eye to avoid walking backwards), and lower it to the ground.

4 and 5 man the wheels.

The limber moves as detailed in "Field Artillery Drill."

As soon as the trail has been lowered to the ground—

1 ships the handspike and directs the howitzer on to the target, pointing out the target, if necessary, to 4, and chalks each deflection for his howitzer, as it is ordered on the trail.

2 puts on the brake, takes the lanyard out of his tube pocket and holds it, hook in his left hand, extractor in his right.

3 puts on the brake and opens the breech.

4 clamps the sliding leaves of fore and tangent sights at the same graduation (putting on any deflection ordered), unclamps the jamming gear, and lays the howitzer after it is loaded; as soon as the howitzer is laid, he clamps the jamming gear, removes the clinometer, and lowers the tangent sight if it is elevated.

5, assisted by 6, prepares to issue ammunition.

The two highest numbers unhook the wheel horses.

As soon as the howitzer is in position the section commander will measure the inclination of the trunnions by means of his small clinometer, and will order the necessary correction in deflection.

The position of the detachment is as follows:—

WAGON SUPPLY.

1 one yard in rear of the trail eye, and on the left of the handspike.

2 and 3 close to and facing the breech.

4 on the right of the trail eye.

Both Nos. 5 in rear of the wagon body.

6 and 7 covering their No. 5, ready to receive ammunition from him alternately.

8 and 9 covering the other No. 5, ready to perform the duties of 6 and 7 to the other howitzer.

The men belonging to those wagons which do not cover the howitzers in action are marched up to the battery under orders given by the captain as soon as he halts the wagons in the position he has chosen for them. Until they arrive the men with the wagons up with the battery supply ammunition to both howitzers.

The captain will, however, not send the men belonging to the wagons of the alternate howitzers up to the front line unless the labour of running the howitzers up and supplying them with ammunition is heavy. When they reach the line of guns they will report themselves to their section commanders.

LIMBER SUPPLY.

1, 2, 3, and 4 as above.

5 (and 6 if present) in rear of the limber.

Action right, left or rear, is the same, except that at—

Action Right.—The trail is carried round a quarter of a circle only.

Action Left.—The trail is carried round a quarter of a circle to the right, 3 in this case shifting round the trail eye.

Action Rear.—The trail is not carried round.

The limber in all cases moves as detailed in "Field Artillery Drill."

As soon as the howitzer is in action the section commander gives the order "to load":—

TO LOAD.

(At drill rounds will not be loaded, but drill shells filled with sand will be placed in succession on the ground on the right of the howitzer by the man who supplied them to 3, after 3 has gone through the motion of loading. The end of the handspike will be placed against the base of the breech ring in the action of ramming home. Rounds will be returned to their proper place at the conclusion of the series on the order, "Replace ammunition.")

Section Commander.	1.
--- Section,* Charge—Load.	No. ---, Charge—Load.

At the order from 1—

5 issues the ammunition ordered to 6 or 7. 6 or 7 receives the ammunition from 5, placing the cartridge under his left arm, carrying the shell by the carrying strap, with the base of the shell to the front, hands them to 3, and assists to run up, after which he returns to the wagon or limber.

At the first order to load, two rounds are brought up to the howitzer by 6 and 7, and 6 returns to the wagon or limber, as soon as he has handed his round to 3, 7 remaining ready to supply his round. The cartridges of the following rounds are sent up in their tins.

Ammunition will be taken first from the rear of the wagon body, then from the front of the wagon body, the ammunition in the limbers being left to the last.

3 uncaps the fuze or removes the safety pin and places the shell in the bore.

1 as soon as he sees 3 ready to load, takes the handspike in the centre with his left hand back up, takes a pace to the front with his left foot, and, placing the copper-shod end against the shell, rams it gently home; then, keeping the handspike against the shell, he applies his whole force to ensure its being properly home. He then steps back and replaces the handspike in the socket.

3 then places the cartridge in the chamber (rings to the front), closes the breech, and holds up the cam lever, whilst 2 inserts a tube.

DUTIES.

1 commands, attends to the handspike, rams home, lifts at the handspike, in running up or back, and traverses.

He is responsible for the entire service of his howitzer. He only gives the words of command shown for him, he does not repeat the section commander's orders. His executive orders shall be no louder than is necessary for his sub-division to hear.

While in action 1 will pay particular attention to the following points:—

(1) That the most suitable ground available is selected for the position of the howitzer.

(2) That the breech is properly closed.

(3) That the deflection ordered is chalked on the trail.

* When specifying the charge the order is "Full charge" or "Charge core and —rings."

Should a case arise in which it is desirable that 1 should lay, he will perform the duties of 4, with the addition of "commands," 4 performing 1's duties with the above exception.

He will traverse according to 4's signals.

2 attends to the brake and vent, fires, and mans the wheel.

3 attends to the brake and breech, receives a round of ammunition from 6 or 7, uncaps the fuze or removes the safety pin, loads, and mans the wheel. He opens and closes the breech as follows:—

To Open the Breech.—He takes hold of the cam lever with his right hand, releasing the lever catch with his right thumb, raises it to its full extent, draws it to him as far as it will go, using both hands, partly folds it down with the left hand until the breech screw is started, then raises it to its full extent, and at the same time throws the breech open by the loop with his right hand.

To Close the Breech.—With his left hand he releases the catch on the right of the breech, takes hold of the cam lever with his right hand, swings the breech screw and carrier ring round until the carrier ring touches the breech; he then grasps the lever with his left hand, keeping it raised, and with the palm of his right he pushes the breech screw home, forcing the lever from him as far as it will go, then folds it down, seeing it is secured by its catch.

4 places aiming posts, lays, and attends to the jamming gear, sights, and clinometer.

He will bring the howitzer into a convenient position for loading, and will clamp the sights at the elevation and deflection ordered.

He will complete the laying as soon as the howitzer is run up, either by laying directly on the target, or an aiming post placed in the line of fire, or auxiliary mark. Elevation as a general rule will be given by clinometer. In giving elevation he must always depress last.

Deflection will be first put on the sliding bar; if more is required, on the sliding leaf of the tangent sight, and if more still, on the sliding leaf of the foresight; remembering that the leaf of the foresight should be moved to the right for "left" deflection, and to the left for "right" deflection.

If through casualties there are no N.C.O.s left in the detachment, 4 will command in addition to his other duties.

5 fuzes shell, supplies 6 or 7 with ammunition.

6 supplies 3 with ammunition, helps in running up, returns empty cartridge tins, and assists 5.

7 performs the same duties as 6.

8 and 9 unhook the wheel horses, supply ammunition to the howitzer of their section which is not covered by the wagon, and assist in running up.

The right (or left) wagons of sections accompany their howitzers into action.

CASUALTIES.

The captain is responsible for the replacement of casualties as directed in "Field Artillery Drill."

Section commanders order such changes of duties in their sections and detachments as they consider necessary.

If the full detachments cannot be maintained the reduction is made as follows:—

(i) With one man short, 2 is dispensed with, 3 performs 2's duties in addition to his own.

(ii) With two men short, one of the men supplying ammunition is dispensed with as well as 2.

(iii) With three men short, 3 is dispensed with in addition to the above. In this case the man supplying ammunition loads in addition, and 1 performs the duties of 2 and 3 (except loads) in addition to his own duties.

SIGNALS.

Nature.	By whom given.	Meaning.
Motions with the palm of either hand in } the required direction }	Layer	Trail right or left.
Drops his hand	Layer	Halt (traversing)

TO FIRE.

No howitzer is ever to be fired without an order from 1, and 1 must never give this order until he has received the order from the section commander, and seen that the howitzer is in all respects ready.

<i>Section Commander.</i>	1.
Fire No. _____, Gun.	No. _____, Fire.

At the order from the section commander—

1 steps clear of the recoil to the left, and gives the number of his gun as a caution.

At the caution from 1—

2 hooks the lanyard to the tube (passing the lanyard between the spokes and through the hole in the bracket of the carriage should the elevation of the howitzer render it necessary, usually when over 25°), steps outside the wheel, and stands facing the breech, holding the lanyard slack with his right hand.

3 and 4 step clear of recoil.

As soon as he sees 2 ready and the other numbers clear, 1 gives "Fire."

At the order from 1—

2 fires the howitzer by jerking the lanyard smartly with a downward swing of the arm; he then places the lanyard round his neck.

MISSFIRE.

If there is a missfire,* after an interval of 10 seconds the detachment resume their positions, 2 takes out the old tube and puts in a new one, and the howitzer is fired when ordered.

Directly the howitzer stops in its recoil it is re-loaded by order of 1.

2 takes out the tube.

* It is not a missfire if the wire breaks and the friction bar is *not* drawn.

- 3 opens the breech.
- 4 brings the howitzer to a convenient position for loading, sets his sights and clinometer.
- 6 or 7 brings up a shell and places it on the ground near 3, and stands ready to man the left wheel.

*As soon as the howitzer is re-loaded it is run up to its previous position.**

- 1 lifts at the handspike.
- 2 and 3 man the wheels, assisted by 6, 7, and extra men if necessary.

As soon as the howitzer is run up—

- 1 stands ready to traverse as directed by 4.
- 2 takes the lanyard from round his neck, and holds it with the hook in his left hand, extractor in his right.
- 4 lays the howitzer, removing the clinometer and lowering the tangent sight, if necessary, when laid.
- 6 or 7 takes back the cartridge tins when empty to 5.

TO STAND FAST.

Section Commander.		1.
Stand Fast.		

At the order from the section commander—

All stand fast, whatever they are doing, except that 2 unhooks the lanyard if it is hooked to the tube, and 3 places the shell in the bore if the safety pin has been withdrawn.

At the order "Go on" the work is continued.

TO CEASE FIRING.

Section Commander.		1.
— Section, Cease Firing.		

At the order from the section commander—

- 1 straps the handspike on the trail, and removes all chalk marks.
- 2 takes off the break and puts the lanyard in the tube pocket.
- 3 takes off the break.
- 4 puts the sliding leaves of the fore and tangent sights to "3" and the bar to zero and replaces the clinometer in its case, brings the howitzer into a horizontal position and clamps the jamming gear. When limbered up the howitzer will thus be slightly depressed at the muzzle, in which position it will always travel.
- 5 and 6 replace unexpended ammunition and close the ammunition box.

In no case should a fuze without a cap or safety pin be placed in a wagon or limber.

* At drill the detachment will constantly practice running up; for this purpose two markers will be placed on the ground by 6 or 7, after each round, 3 yards in front of the howitzer directly it has been fired. The howitzer when loaded will be run up to the wheel markers.

TO LIMBER UP.

<i>Section Commander.</i>	<u>1.</u>
— Section, Front limber up.	

At the order from the section commander—

The trail is lifted by 2 and 3 and carried round a half-circle to the right, and lowered gently to the ground. 4 and 5 man the wheels. As soon as the trail is round, 2 and 3 get under cover between breech and wheels, 1 in front of 2, 4 and 5 between muzzle and wheels, 6, if present, in front of 4, the whole with their backs to the axletree. The limber comes up as detailed in "Field Artillery Drill," and 1 gives—"Halt, Limber up."

At the order from 1—

2 and 3 lift the trail and place it on the hook, 4 and 5 man the wheels, 3 keys up, and the whole form the order of march or detachment rear as ordered.

"*Right Limber up.*"—The same as "Front Limber up," except that the trail is only carried round a quarter of a circle.

"*Left Limber up.*"—The trail is carried round a quarter of a circle to the left.

"*Rear Limber up.*"—They get under cover as before.

The limber in all cases moves as detailed in "Field Artillery Drill."

TO PICK UP THE LINE OF FIRE.

Aiming posts are issued in pairs of the same colour, the right howitzers of sections having red, the left blue. They should be planted with their coloured sides towards the howitzer, except when, owing to light, &c., the section commander orders the white sides.

ONE AIMING POST.

<i>Section Commander.</i>	<u>1.</u>
— Section—One Aiming Post.	

At the order from the section commander—

1, standing at the end of the handspike, directs 4 by signal to plant his aiming post in line with the target.

2 and 3 mark on the ground the position of the wheels.

4 doubles out about 30 yards to the front with one aiming post; which he plants as directed by 1, and then doubles back and continues laying.

As soon as all the aiming posts have been planted the firing is continued, the howitzer being laid for direction on the aiming post.

On "cease firing," the post is brought in by 4 on the order "In aiming posts."

FIRING FROM BEHIND COVER AND AT CONCEALED TARGETS.

The occasions requiring the use of two aiming posts may be grouped under two heads:—

(1) When the target can be seen from some point in line with it and the position to be occupied by the battery, and within easy access from the latter.

(2) When the target can only be seen from a point on the flank of the position to be occupied by the battery.

In the first case the line of fire is laid down as follows:—

The battery commander plants two aiming posts to mark the line of fire of one of his guns in front of the position to be occupied. He then retires to that position and orders "Section Commanders and Layers" "Two Aiming Posts." The section commanders and layers dismount and fall out to the battery commander, each layer bringing two aiming posts, a laying cord, and a clinometer. The battery commander then points out the general alignment of the battery. The layers then extend behind the crest of the hill, the front aiming post of the gun of which the line of fire is already marked being planted by its layer in line with the two already placed by the battery commander. The other layers take their interval from him by means of laying cords, and after being dressed by a section commander plant their front posts at his signal. It is essential that the cords should be tight and the layers correctly dressed. The process is repeated for the rear aiming posts about twenty yards further back, and the layers then roll up their cords and mark the positions for their guns. The battery commander gives them the elevation for the first round. When the layers have selected their positions and received the elevation, they kneel down and set their clinometers. The section commanders then double back to the battery and mount if necessary.

In the second case, when the target can only be seen from a point on the flank of the position to be occupied by the battery, it is necessary to obtain the line of fire by means of observations made at that point.

Should this point be so far from the battery that its commander cannot carry out the following instructions himself as well as command his battery, an observing party, consisting of one officer, two range takers, one signaller, and two horse holders, must be detailed. This party proceeds to its station, from which the position to be occupied by the battery as well as the target must be clearly visible, and dismounts. The officer sets up his field plotter and directs the base of it on the point near the position to be occupied by the battery where the battery instrument has been set up, and which point is marked by the battery signaller.

The range takers measure the distance to the battery, and the officer then sets the scale on the base at the graduation corresponding to this distance, and clamps it. He then directs the target arm of the instrument on the target, and as soon as the range takers have found the distance to the target, he moves the range arm of the instrument until it cuts the target arm at the graduation on the latter which corresponds to the distance given by the range takers. He then reads off the angle shown on the arc by the range arm, and this is immediately signalled to the battery; the range shown on the range arm at the point where it intersects the target arm is then read and signalled to the battery.

In the meantime the battery instrument is set up, and its base aligned on the point marked by the observing party's signaller. When the angle is signalled, the arm on the battery instrument is set at this angle, and the battery commander's aiming posts are planted in the line marked by the arm as described in the first case.

The range signalled by the observing party is a good guide as to the initial elevation to be given.

On "cease firing," the posts are brought in by 4 on the order "In aiming posts."

AUXILIARY MARKS.

Advantage may be taken of the varied scope of crossbar sights to obtain an auxiliary mark for use in laying the howitzer. Some conspicuous object (such as a cleft in a hill, &c.) may be chosen, on which the howitzers should be laid with the necessary deflection to bring the fire on the target. Aiming posts may be used to line the howitzer on the auxiliary mark if necessary. The howitzer then being run up to the same place each time, can be laid as before every round.

If possible the auxiliary mark should always be in front, and distant.

DESCRIPTION AND USE OF CROSSBAR SIGHTS.

The howitzer is sighted on both sides with crossbar sights, which consist of a tangent and fore sight.

The tangent sights drop into sockets which are set vertically, the vertical steel bars are graduated to 10° , and adjustment is effected by a removable clamp. The head is of bronze, through which slides a steel horizontal crossbar, which can be fixed in any position by a clamping screw. The crossbars are graduated on the inside, i.e., the side nearest the howitzer, with a deflection scale giving 1° right and 3° left deflection, and on the outside with a similar scale graduated from 0° to 6° , on which slides a reversible leaf, having a notch for forward laying and a point and crosswires for reverse laying. The bars are reversible, being graduated on one edge for the right side and on the opposite edge for the left side of the piece, and are stamped accordingly.

The foresights consist of steel stems with horizontal crossbars, forged solid. The bars are fitted with a sliding reversible leaf, having a point for forward laying, and a notch and telescopic hole for reverse laying, and are graduated from 0° to 6° , to correspond with the crossbars of the tangent sights.

To Use the Crossbar Sight.

As a rule these sights will be used for laying for direction only elevation being given by means of the clinometer

For Forward Laying.

See that the notch on the sliding leaf of the tangent sight and the point of the sliding leaf of the foresight are uppermost, and set both sliding leaves at the third graduation, put on the deflection ordered by sliding the crossbar of the tangent sight to the right for right deflection, to the left for left deflection, and lay the howitzer on the target or aiming post by moving the trail as required.

DISABLED ORDNANCE.

Whenever operations are not described in detail, or men are not told off to particular duties, I will order such duties to the several men as may be required.

Operations can thus be carried out without confusion, though no precise detail has been laid down.

TO REPLACE A DAMAGED WHEEL.

Should a howitzer wheel be disabled in action, it should be immediately turned so as to bring the sound portion on to the shoe, and if necessary lashed, and notice should be sent to the captain.

The latter will immediately send up one of the spare wheels, which will be brought alongside the damaged one and the wheels changed as follows:—

<i>Section Commander.</i>	<i>1.</i>
No. ———, Change Wheels.	No. ———, Change Wheels.
	Lift—Lower.

At the order "Change Wheels" from 1—

1 and 6 go to the damaged wheel, 1 in rear, 6 removes the linchpin and washer.

2, 3, 4, and 5 man a 6-foot handspike, which is placed under the axletree by 2 or 3 (according to side), 8 and 9 lay hold of the top of the opposite wheel, and by hauling on it assist.

6 supplies 2 or 3 with a 6-foot handspike.

At the order "Lift"—

The axletree is lifted and the damaged wheel is taken off, 6 rolls it out of the way, and the new one is put on by the men who have brought it up.

At the order "Lower"—

The carriage is lowered, the linchpin and washer put on by 6, the handspike replaced by 2 or 3, and all resume their duties in action.

The damaged wheel is either left on the ground, or removed by the men who brought up the new one, as the captain may have directed.

In removing wagon wheels the lifting jack should be used.

INSTRUCTIONS FOR USING CLINOMETER.

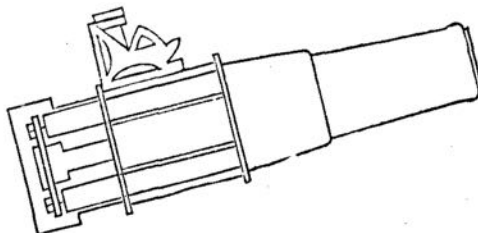
To read the angles marked on the drum.—The brass drum is marked in degrees, commencing at 0° on the top to 45° at the bottom. Each degree is subdivided into 12 parts; each small division, therefore, represents an angle of 5 minutes.

The scale is read from right to left, thus—



the reading opposite the arrow would indicate an angle of 2° 25'.

To lay an howitzer at an angle up to 45° .—Unscrew the drum, until the Δ points to the elevation required, place the clinometer, thus—



on the plane surface cut on the breech, and elevate the piece until the bubble of the spirit-level is in the centre of the tube.

POINTS TO BE ATTENDED TO IN USING THE CLINOMETER.

The base of the clinometer, and the plane surface on which it is to rest, should be clean and free from grit, dirt, or rust.

The clinometer should be set by turning the drum to the left, past the elevation ordered, and finishing by a turn or two to the right to the exact elevation ordered.

The clinometer should be placed on the same part of the plane surface, and the layer should stand in the same place when laying for each round.

When replaced in the case it should be set at 15 degrees.

FIELD PLOTTER.

Consists of two parts:—

1. Instrument "O," for use at the observing station.
2. Instrument "B," for use at the battery.

Instrument "O" consists of an arc graduated in degrees and half degrees, from 0 to 180; for use in connection with this arc there are three scales (a) (b) and (c). The scales are graduated in half inches, from 0 to 40, each half inch is subdivided into four equal divisions; on each scale is a fore and hind sight, which can be folded down when not in use.

Scale (a) works in a guide at the base of the arc, and is adjusted to the required position by a clamp.

Scale (b) is capable of adjustment to scale (a) at the required position by a second clamp, round which it is free to revolve.

Scale (c) is adjusted to the end of scale (a) by a third clamp.

Instrument "B" consists of an arc similar to "O"; to the centre of the base is pivoted a pointer, provided with a fore and hind sight, which can be folded down when not in use.

With each instrument a stand is provided, prepared for the attachment of a collapsible table.

The collapsible table consists of a piece of wood, to either end of which are arranged two sliding pieces of wood in such a manner that the table can be opened to form a support for the instrument, or collapsed for transport.

Instrument "B" can also be used to find the angle, when a change of target is to be carried out, without changing the position of the battery.

The graduations on scales (a) (b) and (c) are units which may be used to represent any convenient distances. Thus for ordinary ranges each unit should be taken to represent 100 yards, while in the case of very short or very long ranges they may be taken to represent 100 half or 100 double yards respectively.

METHOD OF DRILLING RECRUITS.

GENERAL REMARKS.

Many good recruits are acquainted only with the commonest English words, and, as their duties and the material they have to use are altogether new and strange, instructors should be careful—

To use the simplest language possible.

To explain, as they occur, all technical terms.

To illustrate descriptions by means of a piece of chalk or otherwise, and in all cases to render clear the object of the various duties.

Not to attempt to teach recruits elaborate descriptions, exact measurements, &c., which they do not understand.

To avoid needless repetitions, or wearying the men by keeping them for a long time at one thing; the drill should be varied by short descriptions (avoiding manufacturing details), setting fuzes, &c.

To bring men forward by successive steps, by explaining a position and then doing it; for instance, when commencing recruits' gun drill, the instructor should himself show how a duty should be performed, and then cause every man in turn to do that duty (make every man do 1's duty, then every man 2's, then 4's and so on). When each man knows the duty of each post separately, the numbers who work and move together should be instructed after the manner described below, before commencing gun drill in quick time.

Great patience is necessary on the part of the instructor. He must make allowance for the different capacities of the recruits, and squads should periodically be arranged so that the intelligent soldier may reap the advantage of his work, and not be kept back by those of inferior ability. Recruits, as they progress, should be called out in turn to drill, for this gives a man confidence, helps him to learn, and causes him to take an additional interest in his work.

The instructor should place himself where he can be seen and heard by all in the squad, should stand in a smart, soldierlike attitude, and should avoid pacing up and down, looking down on the ground, turning his back on the squad, and similar habits, which have the effect of fidgeting the men and distracting their attention.

His explanation should be given in a distinct voice; his word of command should be sharp and decisive.

Stress is laid on the above points, because men unconsciously imitate their instructor. A first-rate instructor will make a good detachment; his manner and style are therefore of the first importance.

The utmost alertness of attitude and smartness of movement should be enforced throughout gun drill.

The instructor can at any time ascertain that each number is at his post by proving. This he does by calling out "*Prove your numbers—1, 2, &c.*" The man called upon raises his right hand and extends it smartly to the front, hand open, thumb uppermost, hand as high as the shoulder. When the next number is called he drops his hand. The last number lowers his hand at the word "*Down.*"

If at any time the instructor wishes to change the numbers, he gives the order "*Change Rounds.*" On this 1 becomes 9; 9, 8; 8, 7; 7, 6; 6, 5; 5, 4; 4, 3; 3, 2; 2, 1.

The following is only an example of how the drill should be taught; it being of course clearly understood that some of the details will vary with particular equipments.

The detail of the other operations should be divided up in a similar manner.

TO FIRE.

At the order "*Fire No. — Gun*" from the section commander—

1 steps clear of the recoil to the left, and gives the number of his gun as a caution.

At that caution—

2 hooks the lanyard to the tube, passing the lanyard between the spokes, &c.

3 and 4 step clear of the recoil.

As soon as he sees 2 ready, and the others clear, 1 gives "*Fire.*"

At that order—

2 fires the howitzer by jerking the lanyard smartly with a downward swing of the arm; he then places the lanyard round his neck.

"Go on"

Next explain that directly the howitzer has ceased recoiling—

2 takes out the old tube.

3 opens the breech.

4 brings the howitzer to a convenient position for loading, &c

2, 3, and 4—"Go on"

LIST OF STORES.

CARRIAGE.

Article.	No.	Where carried.
Bit, vent, 14-inch	1	On right bracket (inside).
Box, tool, leather	1	Between side brackets.
Brush { breech screw	1	In leather box, between brackets.
{ pisabala	1	Between side brackets.
Buckets, water, G.S., leather ..	2	On breast chain rings.
Can, oil, lubricating, No. 9 ..	1	Between side brackets.
Chains, suspending drag { inside ..	1*	} In leather box, between brackets.
{ outside ..	1*	
Cover, breech	1	Strapped to axletree, left side, when not on howitzer.
Cutter, wire	1	On right tensile stay.
Driver, screw, G.S., 6-inch ..	1	} In leather box, between brackets.
Hammer, claw, 20-oz. ..	1	
Handspike, traversing, No. 1 ..	1	On top of left side bracket.
Key, fuze, universal	1	In pocket on left tensile stay.
Oil, Rangoon pint	1	In oilcan.
Pincers, carpenters' pair	1	In leather box, between brackets.
Posts, aiming	2	On left side bracket.
{ key, fuze, universal ..	1	On left tensile stay.
Pockets, { T friction tube ..	1	} On right tensile stay.
{ wire cutter ..	1	
Rimer, vent, T	1	} On right bracket (inside).
Rod, vent, 14-inch	1	
Spanners, { McMahon, 15-inch ..	1	} In leather box, between brackets.
{ hydraulic buffer { No. 77 ..	1	
{ " 79 ..	1	
{ " 98 ..	1	
Stave, end, B.L., 5-inch howitzer ..	1	Under left side brackets.
Tampeon	1	Strapped to axletree, right side, when not in howitzer.
Wrench, breech mechanism, A ..	1	In leather box, between brackets.

* 1 per section.

CARRIAGE LIMBER.

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Axes, { felling, curved helve ..	{ 1	—	On platform board.
	—	1	On front of box.
	1	1	} Under limber.
	1	1	
Bags, { kit	2	2	On top of box.
	1	1	} On footboard.
Bar, supporting draught pole ..	1†	1†	
Blankets, G.S.	2	2	On top of box.
Boxes, { cartridge	—	4	} In compartments.
	2	—	
	—	2	
	1	1	Rear of axletree, "near" side.
	1	1	In box on footboard "near" side.
vent, pads, and discs ..	1	1	On footboard, "near" side.

† 1 per section.

Carriage Limber—continued.

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Bolt, stop	1†	1†	In tray A.
Brush, water, carriage	1	1	Under limber, "near" side.
Buckets, water, G.S., leather	2	2	Under limber.
Can, oil, lubricating, No. 3	1	1	} Rear of axletree, "near" side.
Case, can, lubricating, No. 3	1	1	
Cartouche { small	1	—	} In compartment.
large	1	—	
Cartridges, 11 $\frac{1}{8}$ -oz. cordite, size 3 $\frac{1}{4}$..	{ 21	—	In cartouches.
	—	16	In tin boxes.
Case, large clinometer	1	—	In box, rear of axletree.
Clamps, tangent, sight	2	1	In compartment, tray C.
	1	2	In tray A.
Clinometers, { large	1	—	In box rear of axletree, "off" side.
	—	1	In tray C.
	1†	—	In box rear of axletree, "off" side.
	—	1†	In tray C.
Cloths, sponge. §			
Collar, actuating, T tube	1†	1†	In tray A.
Couples, trace	2	2	In tray B.
Covers, cartridges	21	—	On cartridges.
Discs, pad, { adjusting	2	2	} In obturating pad box.
obturing, { protecting	3	3	
Fuzes, per- { D.A. No. 1, Mark II or	25	—	} In fuze boxes.
cussion, { Graze, No. 4	—	16	
Grease, Field's lbs.	3	3	In grease box.
Flames pairs	1	1	On footboard, A.C. and E. subdivisions.
Hook, bill	1	1	Under limber, "off" side.
Keys, { fuze, universal	2||	2||	} On lid of limber box, in pocket.
spring lock	1	1	
Kettle, camp, oval, 12-qt.	1¶	1¶	Under limber, "near" side.
Lanyards, friction tube T	2	2	In tray B.
Lever, cam, with hinge bolt and keep pin	1†	1†	} In tray A.
Link, actuating collar, with axis pin ..	1	1	
Mallets, heel peg	2	2	In bag, on footboard.
Oil, Rangoon pint	1	1	In oilcan.
Pads, obturating	3	3	In obturating pad box.
Pegs, picketing	9	9	In bag, on footboard.
Plates, preserving, bracket foresight**	2	2	In tray B.
Pins, { lynch, second class. (spare)	1	1	Under platform board.
keep, hinge bolt, cam lever	2	2	In tray A.
Rimer, vent, T (spare)	1	1	In tray B.
heel, single	1	1	} In bag, on footboard.
Ropes, { picketing, 4-ft. 9-in.	6	6	
drag, light	1	1	On footboard.
Shells, lyddite, common	{ 21	—	} In limber box.
	—	16	
Sights, cross-bar { tangent	2	2	} In tray A.
fore { right	1	1	
Mark II { left	1	1	

† "A" subdivision only.

‡ 1 per section.

§ 10 per howitzer, carried in ammunition boxes, as convenient.

|| When not in action these keys will be carried in tray B in limber box.

¶ As required.

** When not on howitzer.

Carriage Limber—continued.

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Spades, N.P.	2	2	On ends of limber box.
Springs, {	cam lever	6	In tray A.
	catch, { fore sight	6	
	vent, T axial	6	
	latch, carrier ring	6	
	clip "	6	
Straps, {	carrying projectile.. . . .	2	In tray B.
	securing, 4½ in. × 1 in. (camp kettle lids)	—	In compartment.
Swingletree, No. 10A.. (spare)	1†	1†	On lid of kettle.
Traces, {	saddlery pairs	2	On footboard.
	harness, short	1	
Tubes, T, friction	30	—	In fuze boxes.
Vent, T, axial	1	20	In box on footboard, "near" side.
Washers, drag, 2nd class, "C" (spare)	1	1	Under platform board.

† As required.

WAGON, AMMUNITION.

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Bags, kit	2	4	On top of box.
Blankets, G.S.	2	4	
Boxes, {	cartridge	8	In compartments.
	fuze { No. 27	2	
	" 30	—	
	grease, magazine, 14-lb.	2	
lantern, bull's-eye	1	—	Rear of axletree.
Cartouches, large	2	—	On footboard, "near" side.
Cartridges, 11 $\frac{7}{8}$ -oz., cordite, size 3½	2†	—	In compartment.
	—	32	In cartouches.
	1	—	In tin boxes.
Case, saw, hand	—	1	On lid of box.
Collar, sliding, laying back	1†	1†	On side of box.
Covers, cartridge	24	—	In tray A.
Fuzes, per- {	D.A., No. 1, Mark II,	—	On cartridges.
	cussion { or Graze No. 4	32	
Grease, Field's lbs.	28	28	In fuze boxes.
Handspikes, {	traversing, No. 1	1	In grease boxes.
	common, 6-ft.	1	

† In 6 wagons only per battery.

Wagon, Ammunition—continued.

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Holdall, needles, and silk twist ..	1	1	} In tray A.
Keys, { powder case	1	1	
{ fuze, universal	2††	2††	} In pocket on side of box.
{ spring, lock.. ..	1	2	
Kettles, camp, oval, 12-qt, ..	2†	2†	} Under wagon.
Knife, clasp	1	1	
Lashings, tarred, 1-inch, 10 feet }	2	2	} On axletree.
Lantern, bull's-eye	2†	2†	
Needles, magazine, nickel silver }	1	—	} Under perch.
4-inch	1	1	
Pole, jointed, No. 18§	—	—	} In box lantern.
Saw, hand, 26-inch	1	—	
Scissors, magazine pair	1||	1||	} In case, { lid of box.
Shells, lyddite, common	2‡	—	
Silk twist oz.	—	32	} side of box.
Straps, { carrying projectiles ..	4	4	
{ securing, 4½ in. × 1 in.	—	—	} In ammunition boxes.
(camp kettle lid) ..	2†	2†	
Tubes, friction, { T	30	40	} On lids of kettles.
{ drill	—	—	
Washers, axletree { ⅜-inch thick ..	1¶	1¶	} In trays of boxes.
arm, 2nd class C { ⅜ " " ..	1¶	1¶	

† As required.

‡ For each wagon carrying spare No. 18 pole.

§ 5 per battery. || 1 per section. ¶ In 6 wagons only per battery.

†† When not in action these keys will be carried in tray A.

WAGON, LIMBER.

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Axes, { felling, curved helve ..	1	1	} On platform board.
{ pick { head, 6½-lb... ..	1	1	
{ helves, 34½ inch ..	1	1	} Under limber.
Bags, { kit	2	2	
{ picketing gear	1	1	} On top of box.
Blankets, G.S.	2	2	
{ cartridge	—	4	} On top of box.
Boxes, { fuze, { No. 27	2	—	
{ " 30	—	2	} In compartments.
{ grease, 3-lb.	1	1	
{ lantern, bull's-eye	—	1	} Rear of axletree, "near" side.
Buckets, water, G.S... ..	2	2	
Brushes, water, carriage	1	1	} On footboard, "near" side.

Wagon, Limber—*continued.*

Article.	Mark I.	Marks I* & II.	Where carried.
	No.	No.	
Cartouche, { small	1	—	} In compartment.
{ large	1	—	
Cartridges, 11 $\frac{7}{8}$ -oz., cordite, size 3 $\frac{1}{2}$	21	—	In cartouches.
	—	16	In tin boxes.
	1†	—	In box rear of axletree "off" side.
Cases, large clinometer	—	1†	In tray C.
Chalk, white box	1	1	In tray A.
	1†	—	In box rear of axletree "off" side.
Clinometer, large	—	1†	In tray C.
Cloths, sponge†	—	—	
Couples, trace	2	2	In tray B.
Covers, cartridge	21	—	On cartridges.
Fuzes, per- { D.A., No. 1, Mark II,	25	—	} In fuze boxes.
{ cussion or Graze No. 4	—	16	
Grease, Field's lbs.	3	3	In grease boxes.
Hook, bill	1	1	Under limber, "off" side.
Jack, lifting, G.S.	1	1	On footboard.
Keys, { fuze, universal	2||	2||	} On lid of limber box, in pocket.
{ spring lock	1	1	
Kettle, camp, oval, 12-qt.	1§	1§	Under limber, "near" side.
Lanyards, friction tube, T	2	2	In tray B.
Lantern, bull's eye	—	1	In box on footboard.
Mallets, heel peg	2	2	} In bag on footboard,
Pegs, picketing	9	9	
Pin, lynch, second class (spare)	1	1	Under platform board.
Ropes, { drag, light pairs	1	1	} On footboard.
{ heel, single	1	1	
{ picketing, 4-ft. 9-in. ..	6	6	} In bag on footboard.
Shell, lyddite, common	21	—	
	—	16	} In limber box.
Spades, N.P.	2	2	
Swingletree, No. 10A. (spare)	1	1	On ends of limber box.
	—	2	On footboard.
Straps, { carrying projectiles	—	2	} In tray B.
{ securing, 44 in. x 1 in. (camp kettle lids) ..	1§	1§	
Traces, { saddlery pairs	2	2	} On lids of kettle.
{ harness, short	1	1	
Tubes, T, friction	30	—	} On footboard.
	—	20	
Washer, drag, second class, "C" (spare)	1	1	In fuze boxes.
			Under platform board.

† 1 spare, per section only.

‡ 10 per howitzer, carried in ammunition boxes as convenient.

§ As required.

|| When not in action these keys will be carried in tray A.

MATERIALS, REPAIRING CARRIAGES, &c.

	War. — Three months' supply.	For use in Peace. — Twelve months' supply.*	For what purpose.	Where carried.
<i>Woolwich Section, No. 4.</i>				
Staples, round, crowned, small	6	2	Wagons, ammunition and store, and artillery	Forge limber.
<i>Woolwich Section, No. 9.</i>				
Solder, tinman's	6	..	Tinwork	} No. 2 drawer, smith's tool chest.
Spelter, brass.. ..	4	..	Brazing	
<i>Woolwich Section, No. 10.</i>				
{ iron, clout, wrought, countersunk head, No. 104 lb. { brad, fine pointed, No. 26 { steel, { fine, No. 72 { clasp, { strong, No. 80	14	1	} General repairs	} No. 3 drawer, wheeler's tool chest.
	1	2		
	2	2		
	2	2		

MATERIALS, REPAIRING CARRIAGES, &c.—continued.

56

	War. Three months' supply.	For use in Peace. Twelve months' supply.*	For what purpose.	Where carried.
Woolwich Section, No. 10—continued.				
Screws, iron, <div>{ flat head, round head, 1½" Tacks, steel, cut, No. 192</div>	48	4	General repairs <div>{</div>	{ No. 3 drawer, wheeler's tool chest.
	24	4		
	24	4		
	36	4		
	36	4		
	36	4		
	36	4		
	24	2		
	1	½		
	Woolwich Section, No. 11.			
Borax, refined	lb.	—	Brazing	{ No. 2 drawer, smith's tool chest.
Glue, best town made	1	½	Forge limber.
Oil, linseed, boiled	—	4	Elevating gear and working parts of carriage.	—
Paint, prepared for use, { lamp black.. blue, ultramarine (dry) red, Chinese (dry)	oz.	4	Lettering batteries	{ Forge limber.
	..	4	Painting discs of aiming posts	
	..	2	..	
	..	2	..	

* Carried as convenient.

† According to the No. of the wheel in the battery.

MATERIALS, REPAIRING CARRIAGES, &c.—continued.

58

	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply.*	For what Purpose.	Where carried.
<i>Woolwich Section, No. 13—continued.</i>				
Lock, springs, ammunition box, B.L. 5-inch howitzer ..	1	1		
Packings, hydraulic, $\frac{1}{2}$ inch square.. ..	9	4		
Pins securing axletree, limber, { inside ..	1	1	..	Forge limber.
B.L., 5-inch howitzer, { outside ..	1	1	..	
Rivets, { boss head, $\frac{1}{16}$ in. x { $1\frac{1}{2}$ in. ..	18	6	..	
steel, { conical head, $\frac{3}{8}$ in. x 3 in. ..	24	8	..	
Staples, lashing, { riveting, $\frac{1}{16}$ inch ..	10	2	Movable steels ..	{ No. 3 drawer, wheeler's tool
Steel, pieces, tire, 12 in. x 3 in. x $\frac{1}{4}$ inch ..	5	2	Securing side arms ..	{ chest.
Steels, movable, { limber hook ..	2	—	Ammunition boxes ..	{ Forge limber.
Soles, drag shoe, No. 6 { trail eye or perch ..	3	3	Ring tires ..	
	3	2	..	
	3	—	Aiming posts ..	
	1	—	Axes, felling and pick.. ..	Store wagon.
	2	—	Axes, pick; staves, end; and spades	
	2	—	Case, oil can, and grease box.. ..	
	3	—	Blankets ..	
	6	3	Camp kettle lids, drag ropes, &c. ..	
	4	—		

* Carried as convenient.

† If required. See footnote †, page 11.

*Woolwich Section, No. 13—continued.*Washers, packing, pipe connecting buffers (leather)
(set of 2) sets

Forge limber.

*Woolwich Section, No. 14.*Keys, split, round, loop { $\frac{1}{8}$ in. \times $1\frac{1}{2}$ in. . .
" " " \times 2 " " . . .
" " " \times 1 " " . . .
Lead, 0.4 in. \times 0.2 in. section . . . feet{ No. 3 drawer, wheelers' tool chest.
} Forge limber.*Woolwich Section, No. 19.*Felloest { No. 36 or 42 wheel { ordinary . . .
" 35A or 41 " { slip. . .
" 36 wheel . . .
" 35A or 41 wheel { back . . .
" 42 wheel { front . . .

Store wagon.

* Carried as convenient.

† According to the No. of wheel in the battery.

ALTERATIONS.

Para. of L. of C.	Nature of Change.	Remarks.

Para of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

Para. of L. of C.	Nature of Change.	Remarks.

5-IN. B.L. HOWITZER CARRIAGE AND LIMBER.

LIMBER.

1 drag washer, under.	1 drag rope.	1 pair drag ropes.	1 inch pin, under.
1 vent T axial, 3 pads and discs,	2 mallets, 9 picketing pegs, 6 " " hecl, 1 rope, hecl, 2 pairs traces, saddlery. 1 trace, harness, short. 1 felling axe (on front of box).	1 swingletree, No. 10a, 2 carrying pole, 2 harnes, " "	
8 fuzes and 10 tubes.	8 Cartridges in tin boxes, 5 sponge cloths.	8 Spare parts and tools in tray "B."	1 large and 1 small clinometer, in tray.
Common shell.	Common shell.	Common shell.	Common shell.
8 fuzes and 10 tubes.	8 Cartridges in tin boxes, 5 sponge cloths.	8 Spare parts in tray "A."	2 Straps, carrying projectiles.
Common shell.	Common shell.	Common shell.	Common shell.
Common shell.	Common shell.	Common shell.	Common shell.

Fittings for two swords in rear.

1 pickaxe, under.	1 key, lock, in pocket.
rese box, } under.	1 key, fuze, universal, in pocket.
1 can,	
amp kettle,	
	2 water buckets, under.
	† 1 key, fuze, universal, in pocket.

STENTS OF TRAY "A."

ngent .. ..	...	2
re .. ..	...	2
m, with bolt and pin	...	155
...	...	155
P, cam lever ..	...	2
... ..	...	2
... ..	...	1
... ..	...	1
... ..	...	1
... ..	...	1
atch, cam lever ..	...	6
atch, vent T axial	...	6
atch, carrier ring	...	6
lip carrier ring	...	6
atch, foresight	...	6

CONTENTS OF TRAY "B."

Rimer, vent, T	...	(spare)
Lanyards, friction tube, T	...	...
Couples, trace	...	...
Keys, fuze, universal	...	...
Plates, preserving foresight	...	...

CARRIAGE.

I primer, vent T.
I pod, vent.
I bit, vent.

I oil can, No. 9.
I wire cutter, in pocket,
tensile stay.

I tube, pocket, on
slave end, under.

I cover breech.
* I cover shoe.

[2 chains suspending drag shoe.]
[1 breech brush.
2 spammers, hvd. buffer, Nos. 77 and 98.
1 hammer.
1 wrench, B.M.
1 traversing handspike, on top.
1 key, tuzer, universal, in pocket on tensile stay.
2 running posts.

[The
letterbox.
1 spanner, McMahon.
1 screwdriver
1 pinners.
1 grease brush.]

I brush
pliasaba.

1 brake shoe.
1 water bucket.
1 tampeon, strapped
on axletree.

1 brake shoe
1 water bucket.

ction only.
an not on howitzer.
" in "
section.
convenient.
" subdivision only.
" "C," and "E" su

5-IN. B.L. HOWITZER WAGON AND LIMBER.

LIMBER.

1 felling axe. 1 lynch pin, under.	1 dragging jack. 1 bullseye lantern, in box.	1 sawing machine, No. 10A. 2 mallets, 2 picketing pegs. 6 " " 1 rope, heel.	1 drag washer, under.
8 fuzes and 10 tubes. 8 fuzes and 10 tubes. Common shell. Common shell.	8 Cartridges in tin boxes, 5 sponge Common shell. Common shell.	8 Cartridges in tin boxes, clothes. Common shell. Common shell.	2 Straps, carrying projectiles. Common shell. Common shell.
1 Kit bag. 1 blanket. 1 Kit bag. 1 blanket.	1 large clinometer, ** in tray. Common shell. Common shell.	1 large clinometer, ** in tray. Common shell. Common shell.	1 large clinometer, ** in tray. Common shell. Common shell.

camp kettle, } under.
grease box, }
1 pickaxe, under.
Fittings for two swords in rear.
1 key lock, in pocket.
2 water buckets, under.
1 key, fuze, universal, in

CONTENTS OF TRAY "A."

Chalk, white.

CONTENTS OF TRAY

Couples, trace ...
Lanyards, friction tube, T ...
Keys, fuze, universal ...

WAGON BODY:

2 lashings	under,
1 joined	
1 handspike	lashings, 10-ft.,
1 "	

Fittings for 2 cavalry swords and two sword bayonets in front of box.

[illegible]

crease magazine, under.

2 keys, lock. in bucket.

CONTENTS OF TRAY "A" WAGON.

CONTENTS OF BOX A.		WAGON.			
Sissors, magazine	1	Key, powder case ..	..	1
Knife, clasp	1	Keys, tuzé, universal ..	..	2
Tube, drill	1	Collar, sliding, laying back ..	..	1
Holdall, with needles and twist	1	Washers, axletree arm* ..	..	2
Wagons only per battery.			** 1 spare carried per section.		
¶ As convenient.			6 per battery.		
			§§ 2 to each wagon carrying jointed p		

convenient.
" subdivision only.
" "C." and "E." sub

WAGON, FORGE, R.A., MARK III. (PACKED FOR 5-INCH B.L. HOWITZER EQUIPMENT.)

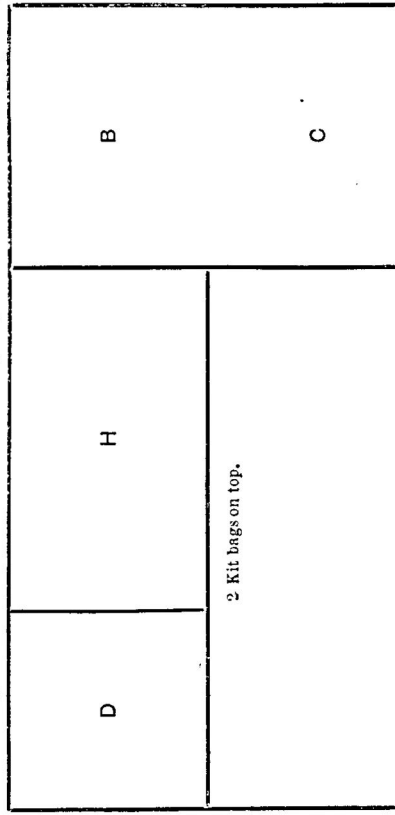
LIMBER.

- 6 Picketing ropes, 4 ft. 9 in., } In bag on footboard.
- 9 Picketing pegs, } In bag on footboard.
- 2 Nails, } In bag on footboard.
- 1 Heel rope, } On footboard.
- 1 Pair drag ropes, } On footboard.
- 1 Swingletree, } On footboard.

- 1 Drag washer, } under.
- 1 Water brush, } under.

- 1 Felling axe, under.

- 1 Bill hook, under.

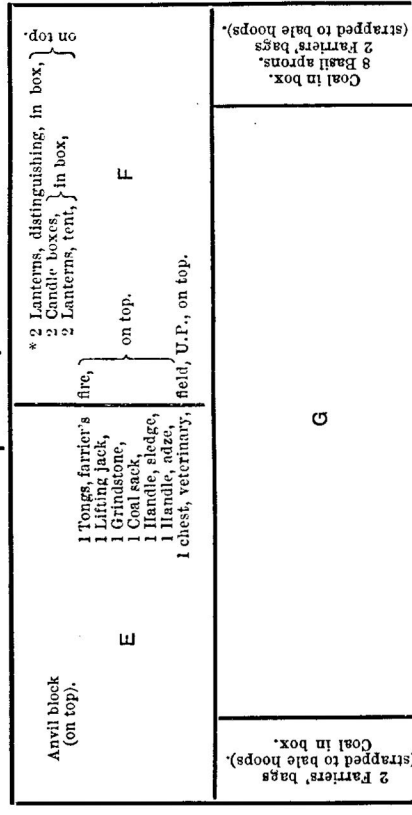


- 1 Key spring lock, } under.
- 1 In pocket, }

WAGON.

- 1 Camp kettle, } under.
- 1 Sledge hammer }
- (smith's), }

- 1 Camp kettle, } under.
- 2 Sledge hammers }
- (farrier's), }



COMPARTMENT "A" (BOTTOM OF LIMBER BOX).

- Dubbing ...
- Glue ...
- Oil, olive ...
- Oil, kerosene ...
- Wax, blue ...

COMPARTMENT "B" (BOTTOM OF LIMBER BOX).

TRAY "C."

- Vice, bench, saddletree-maker's ...
- Cards, towing, small ...

TRAY "D."

- Couples, trace ...
- Keys, { securing, lid ...
- Lock, { pad ...
- Plus, { pole and keys ...
- Plus, { securing axletree ...
- Plus, { round crowned ...
- Plus, { riveting ...
- Plus, { lashing ...
- Plus, { with plate ...

TRAY "A."

- Washers, packing ...
- Packing cotton, hydraulic ...
- Lead, packing ...

COMPARTMENT "H."

- Balls, tension ...
- Plates, dividing ...
- Nuts, spring ...
- Collars, compression ...

COMPARTMENT "E" (WAGON).

- Set of Smith's tools, Set of Thimman's tools, Forge and shoeing tools (farrier's), with Borax, lichen, Sol ammoniac, Spelter, Sawyers' wedges, Stamps, Sponge cloths, Banding iron, Paint (blue and red), and Hot

COMPARTMENT "F" (WAGON).

- Set of Wheeler's tools with Bolts, Keys, loop, Nails, Filing plugs, Rivets, Screws and Tacks.

COMPARTMENT "G" (WAGON).

- Forge, G.S., Mark II.
- Poker.
- Slice.

- 1 Lashing, 10-ft., under.

- 1 Lashing, 10-ft., under.

* For ammunition columns only.
† See footnote §, page 14.

WAGON, STORE, R.A., MARK II.
ACKED FOR 5-INCH B.L. HOWITZER EQUIPMENT).

LIMBER.

- 4 Picketing ropes, 4-ft. 9-in., }
6 Picketing pegs, } in bag on footboard.
2 Mallets, }
1 Heel rope, }
1 Pair drag ropes, } on footboard.
1 Swingletree, }
1 Drag washer, } under.
1 Water brush, }
1 Felling axe, under.
1 Bill hook, under.

A.	B.
C.	D.
E.	

1 Key, lock, in pocket.	1 Pickaxe, under.	2 Water buckets, } under. 1 Grease box, }
1 Camp kettle, under.	1 Crow bar, } under. 1 Camp kettle, }	

Drag shoe.†

WAGON

1 Chest No. 5A, (on top), 1 Case of butchery implements (on top).	I.	
12 Reaping hooks (on top).	II.	12 Reaping hooks (on top).
F. { 1 Package, spare harness, } on top. in saddle blanket,		
G. { 1 Package, spare harness, } on top. in saddle blanket,	III.	
1 Swingletree (on top).		1 Swingletree (on top).
23 Picketing pegs, 5 Heel ropes, double, 9 Picketing ropes, 4-ft. 9-in., } on top, in bag. IV. 2 Lanterns, tent, } in box on top. 2 Candle boxes, }		
1 Lashing, 10-ft., under.		1 Lashing, 10-ft., under.

COMPARTMENT "A" (BOTTOM OF LIMBER BOX).

Soap, yellow.

COMPARTMENT "B" (BOTTOM OF LIMBER BOX).

Oil, kerosene.

LOWER TRAY "C."

(In two boxes.)

Rivets.
Screws.
Staples.

Hooks.
Tacks.
Plates.

Squares, iron.
Washers.
Tallow, in box.

UPPER TRAY "D."

Plate, gullet
1 in, 1 in.

Couples, trace
Locks, pad

Stone, rub.
Handcuffs.

COMPARTMENT "E."

Nummahs, old
Paper { white
brown
Pins, mixed
Sponges, G.S.

Bandages, horse
Canvas, packing
Corks, assorted
Flannel, old
Linen, unbleached

Tape (piece)
Tow { coarse
fine
Twine, packing

BOX I. (WAGON).

Linen, old
Felloes, No. 35A or 41
Hammer, sledge
Hooks { draught
drag chain
Keys, limber hook

Arches { drivers'
universal
Bars, drivers'
Blocks, brake
Cordage, hawser
Canvas, sail

Shoes, drag, No. 8
Soles, drag shoe, No. 8
Strels* { limber hook
trail eye
Spokes, No. 35A or 41
Straps, various

BOX II. (WAGON).

Glue
Hides, various
Hadr. horse, saddlery
Iron flat, 2-ft. 8-in.
Thread, flax

Bars, universal
Basils, unstrained
Clams, collarmakers
Cord { whip
Pannels, nummah

Thread, brown
Twine, quilting
Web, worsted
Worsted, grey

BOX III. (WAGON).

Ring, carrier, } in tray.
Screw, breech,
Iron { bolt, 2-ft. 8-in.
plate, 1-ft. 2-in.
Pipe, connecting buffer
Springs, spiral
Mineral jelly (in 3 cylinders).

Capsquares
Felt, brown, 48-in.
Felloes, No. 35 or 42
Iron, angle, 2-ft. 8 in.
Ropes, wire, drag shoe

Spokes { No. 35
No. 35A or 41
No. 42
Steel pieces, tire

BOX IV. (WAGON).

Stationery.

CONTENTS OF PACKAGE "F."

Bis, portmouth, { Mark II
reversible { heads, bridle
Chains, hanc
Leggings, drivers'
Traces, harness, wheel
Whips, drivers'
Bis { portmouth { chains, curb
hooks, curb
Hooks, pole bar
Irons, stirrup, G.S.
Leathers, stirrup
Bags, nose
Blanket, saddle
Links, double
Pannels, nummah { drivers

CONTENTS OF PACKAGE "G."

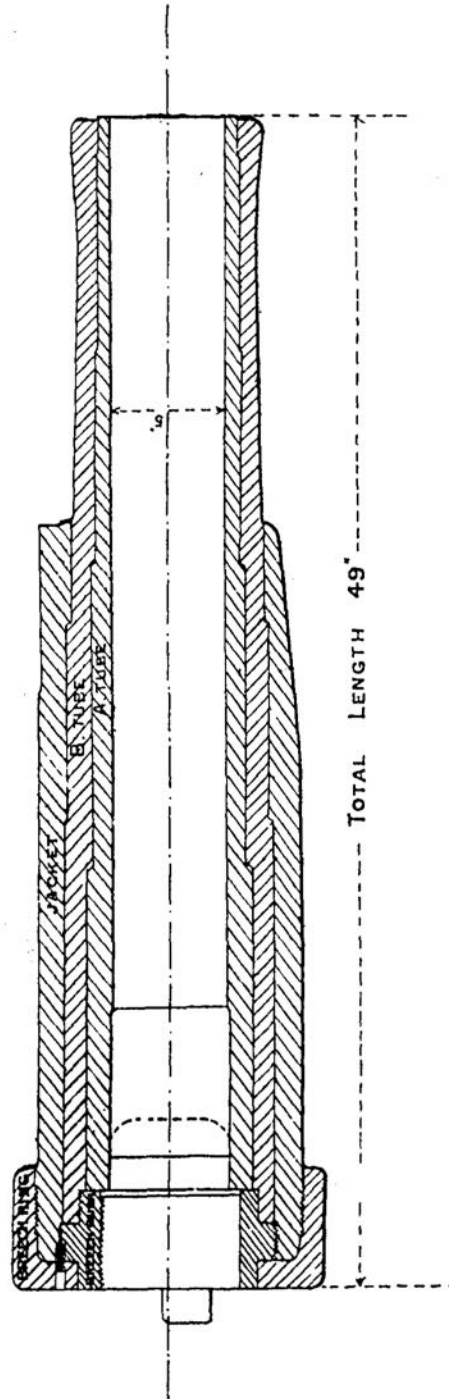
Bags, nose
Blanket, saddle
Breeching
Collars, head, R.A.
Pieces, bucking, 1/2-inch
Reins { also
arrest breeching
Straps { blank
flank
withers, 1/2-inch
Girths, leather
Pannels, nummah { drivers
Runners, stirrup leather
Straps { pole and wallet
shoe case
Surcingle, leather, harness

NOTE.—Each package wrapped in saddle blanket and secured by a stirrup leather.

* If required, see footnote 4, page 11.

ORDNANCE, B.L., 5 INCH HOWITZER, MARK I.

SCALE $\frac{1}{8}$ "



RIFLING

SECTION OF GROOVE.

FULL SIZE.

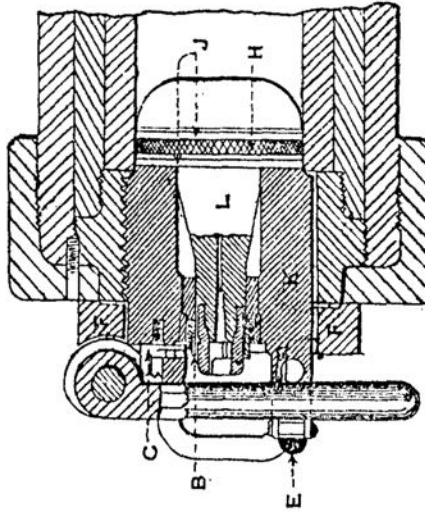
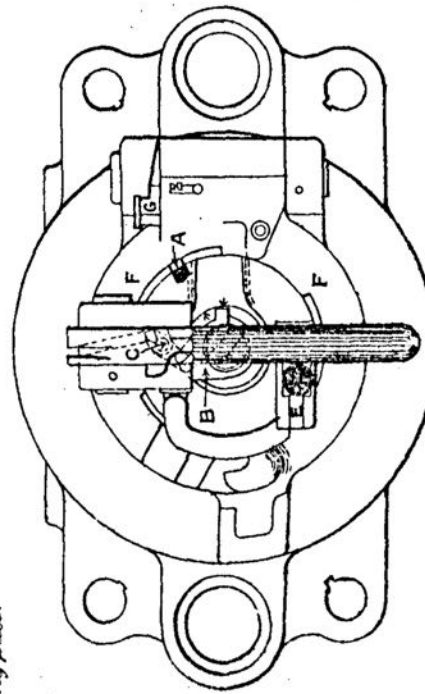
Nº OF GROOVES 20.

ORDNANCE, B.L., 5 INCH HOWITZER, MARK I.

ARRANGEMENT OF BREECH MECHANISM.

SCALE $\frac{1}{6}$ TH.

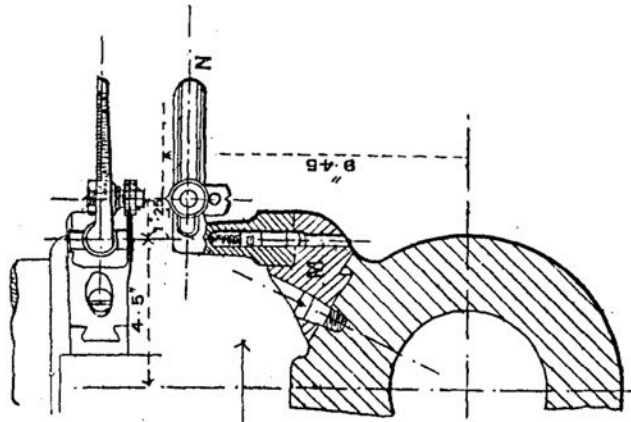
- A. Catch, vent, axial.
- B. Collar, actuating T tube.
- C. Link, actuating collar.
- D. Cam lever.
- E. Catch, cam lever.
- F. Carrier ring.
- G. Latch, carrier ring.
- H. Obturning pad.
- J. Discs, obturning pad.
- K. Breech screw.
- L. Vent, T, axial.



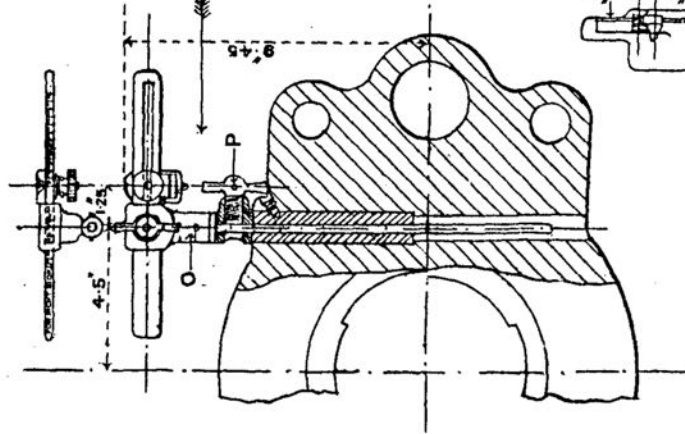
ORDNANCE, B.L., 5 INCH HOWITZER, MARK I.

SIGHTING.

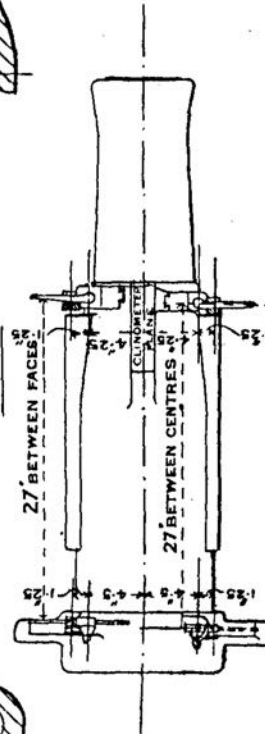
SCALE $\frac{1}{16}$.



RIGHT HAND SIGHTS



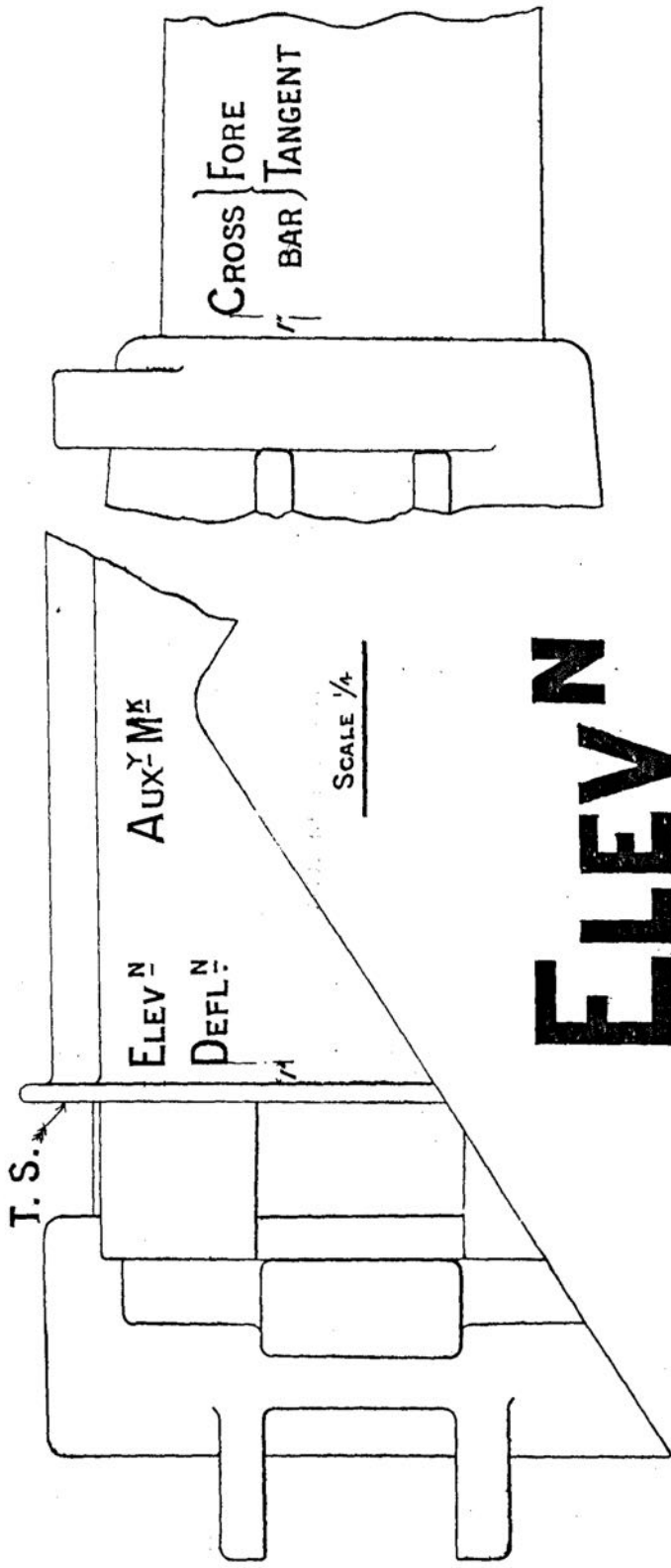
SCALE $\frac{1}{16}$.



- M. Bracket, foresight.
- N. Sight, fore, crossbar.
- O. Sight, tangent, crossbar.
- P. Clamp, tangent sight.

ORDNANCE, B.L.. 5 INCH HOWITZER, MARK I.

STENCILLING.

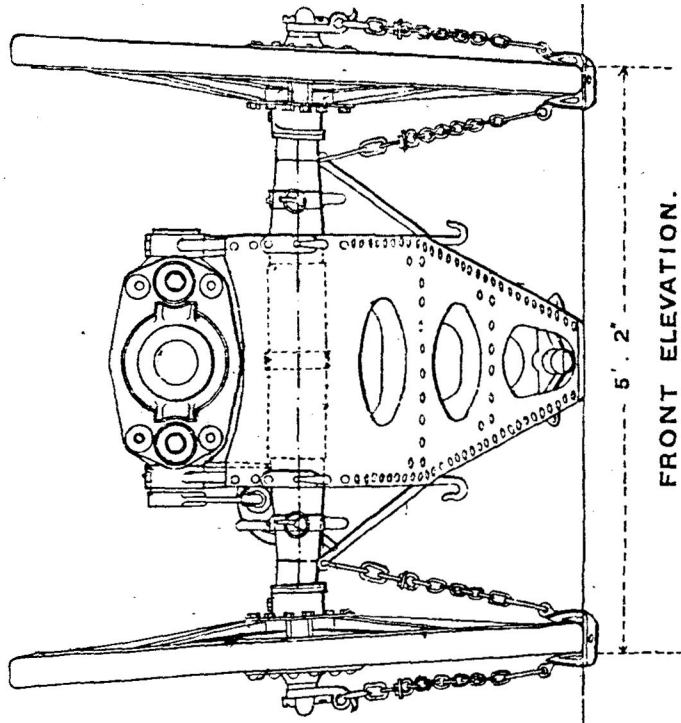
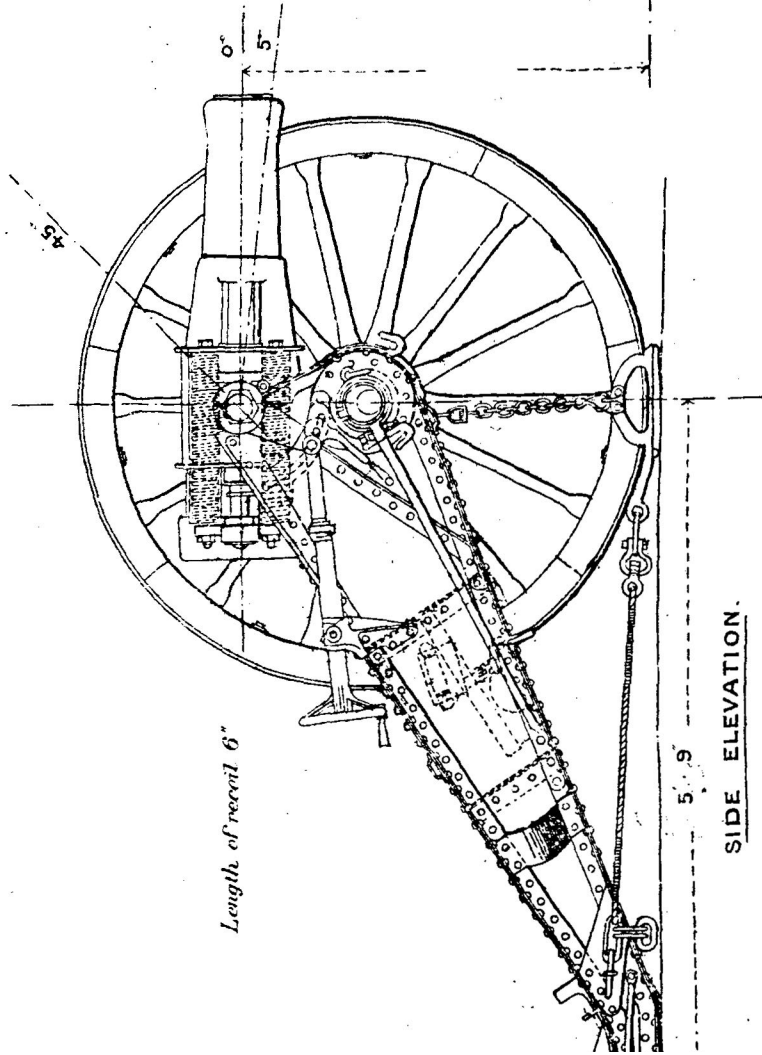


ELEV N

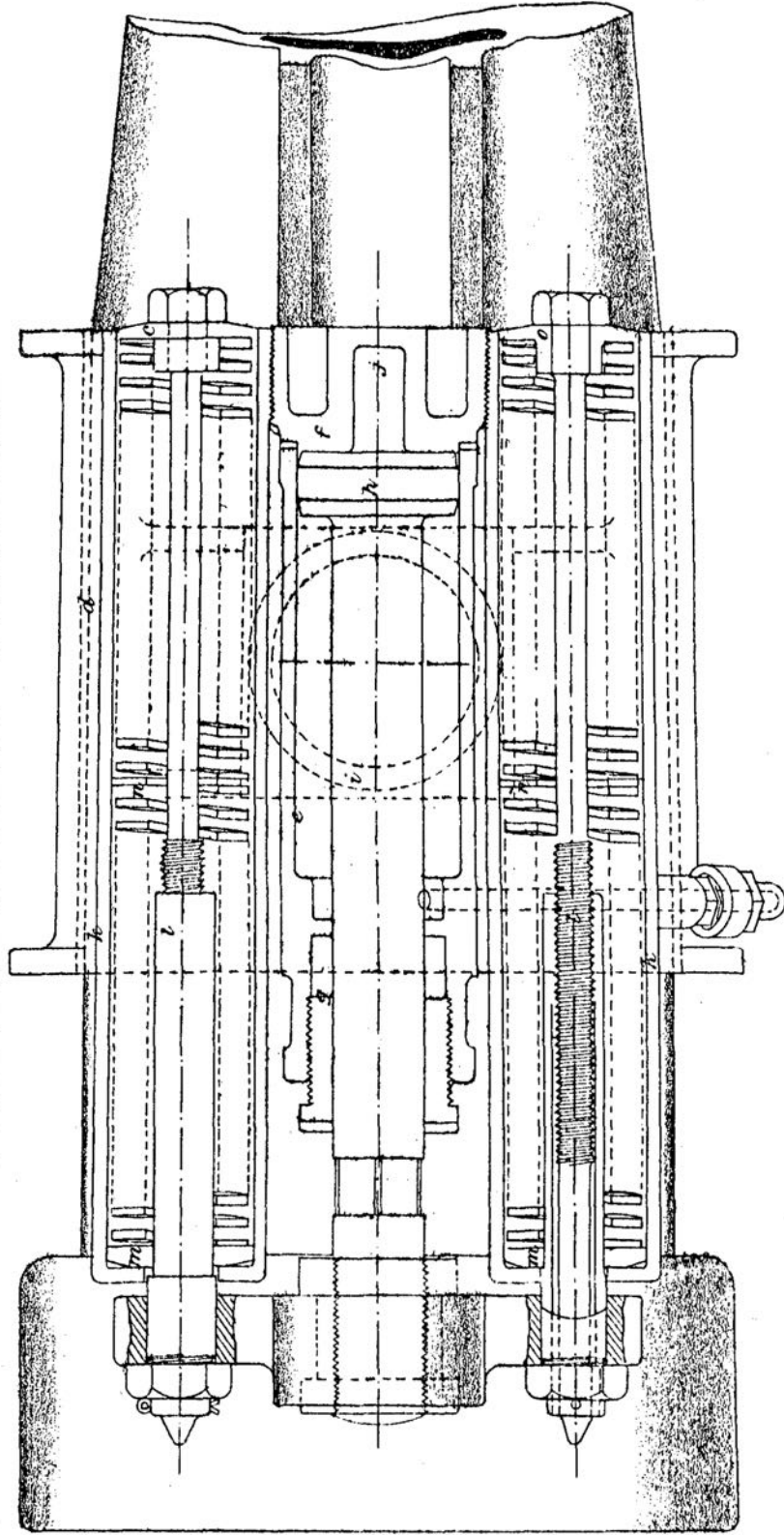
LETTERING FULL SIZE,
TO BE STENCILLED ON IN WHITE PAINT.

CARRIAGE, FIELD, B. L., 5 INCH HOWITZER, MARK I.

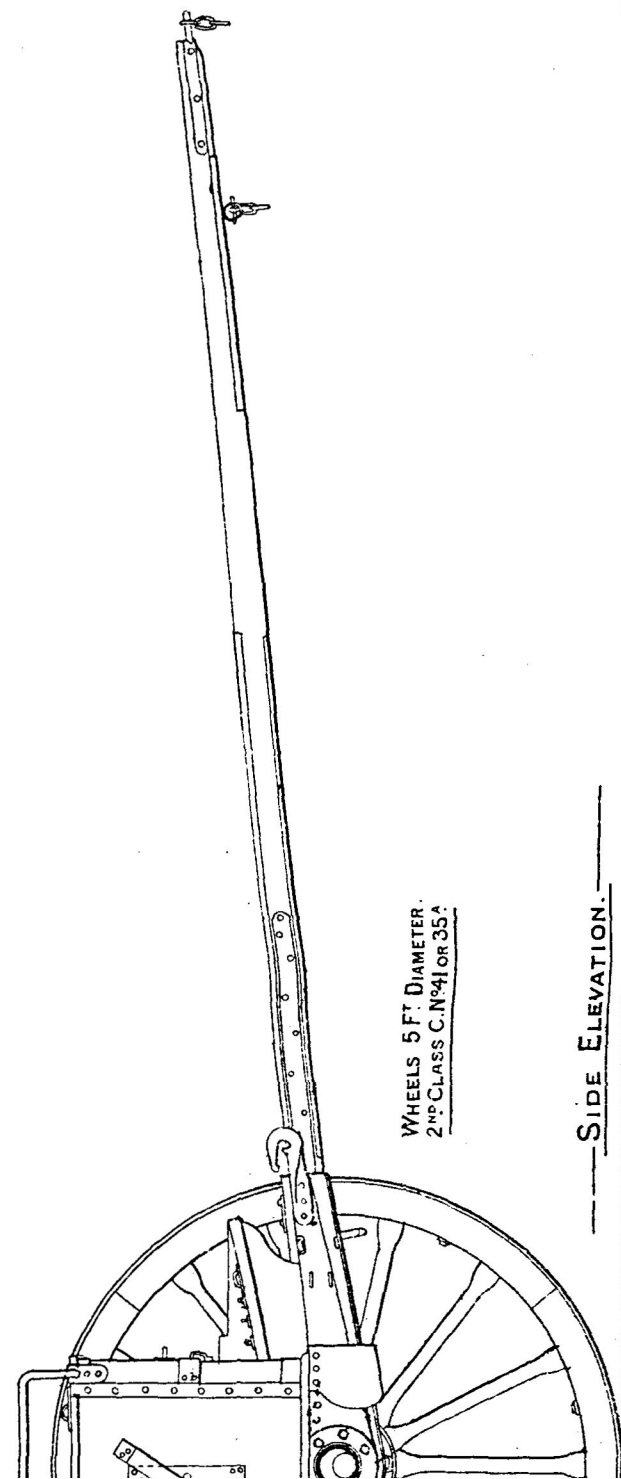
SCALE 1/20TH



CARRIAGE, FIELD. B.L. 5 INCH. HOWITZER. (MARK I)

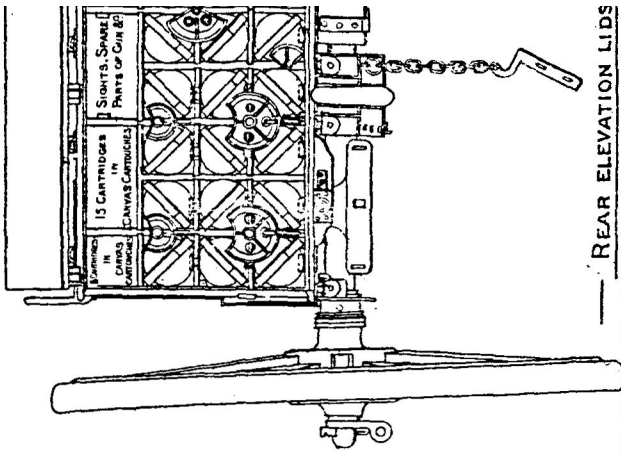


SECTIONAL ELEVATION, SHEWING SECTION OF BUFFER AND SPRINGS.



WHEELS 5 FT DIAMETER.
2ND CLASS C.N. 41 OR 35 A

— SIDE ELEVATION. —



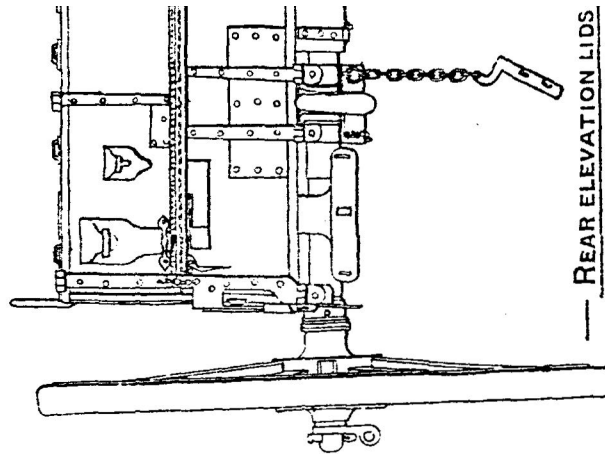
— REAR ELEVATION LIDS —

5' 2"

BER. FIELD. B. L. 5 INCH HOWITZER, MARK I

WAGON
CARRIAGE

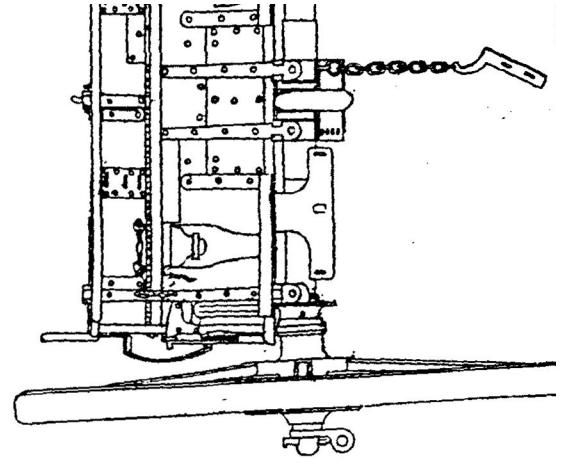
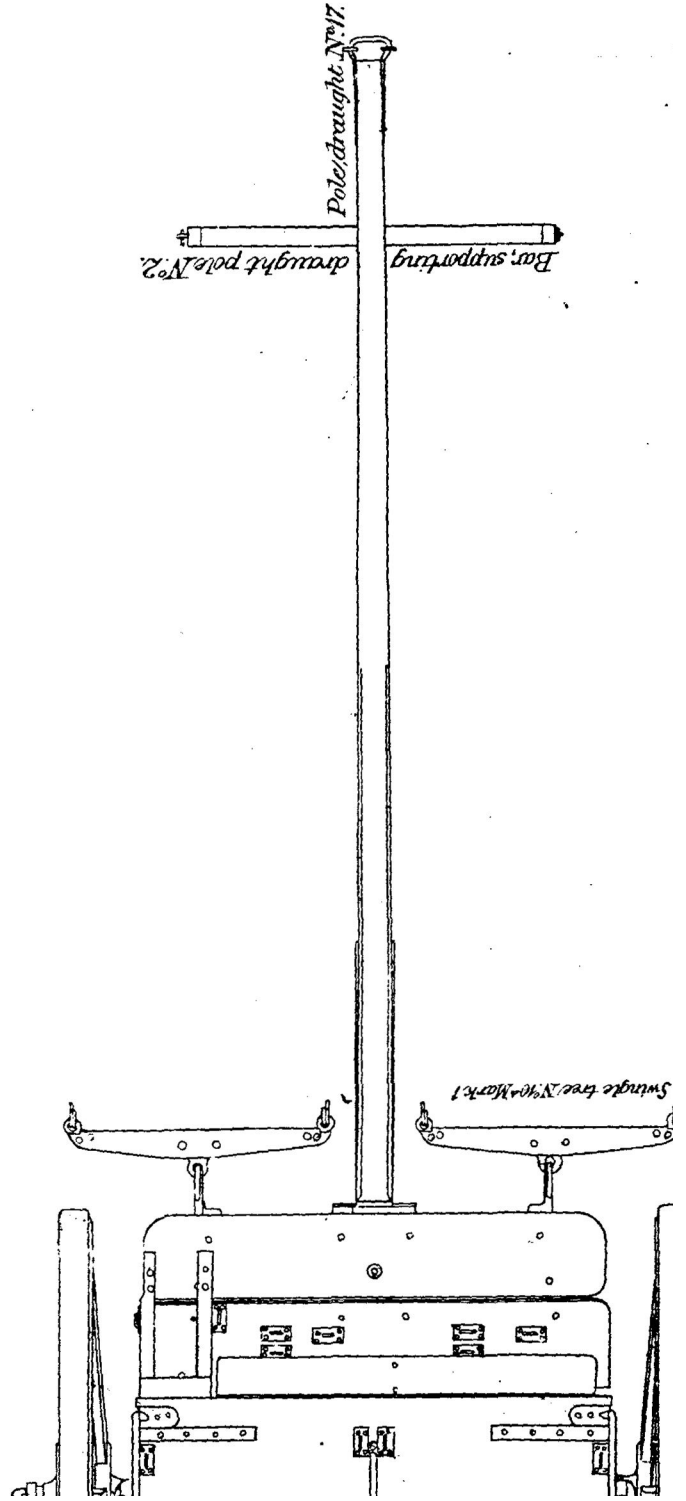
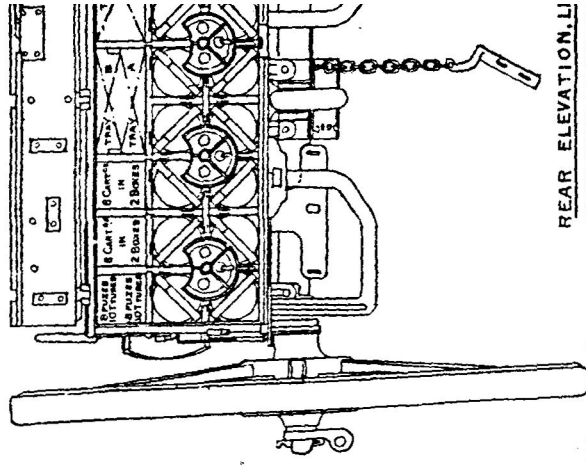
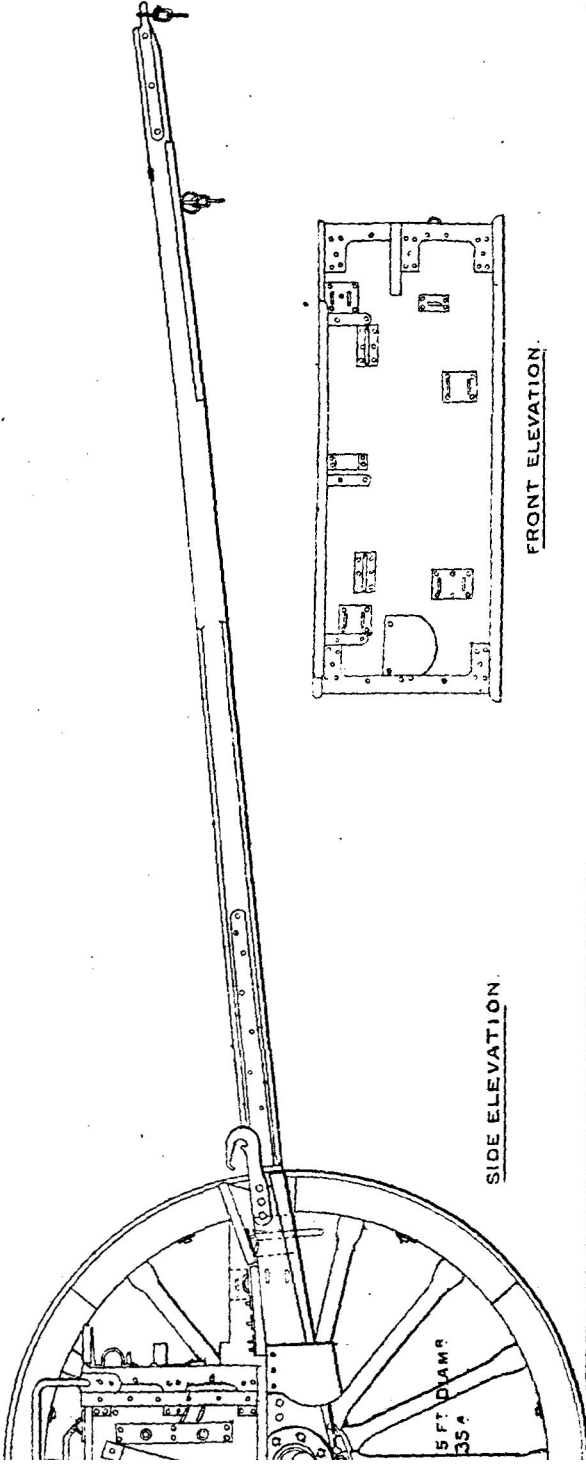
— SCALE 1/20TH —

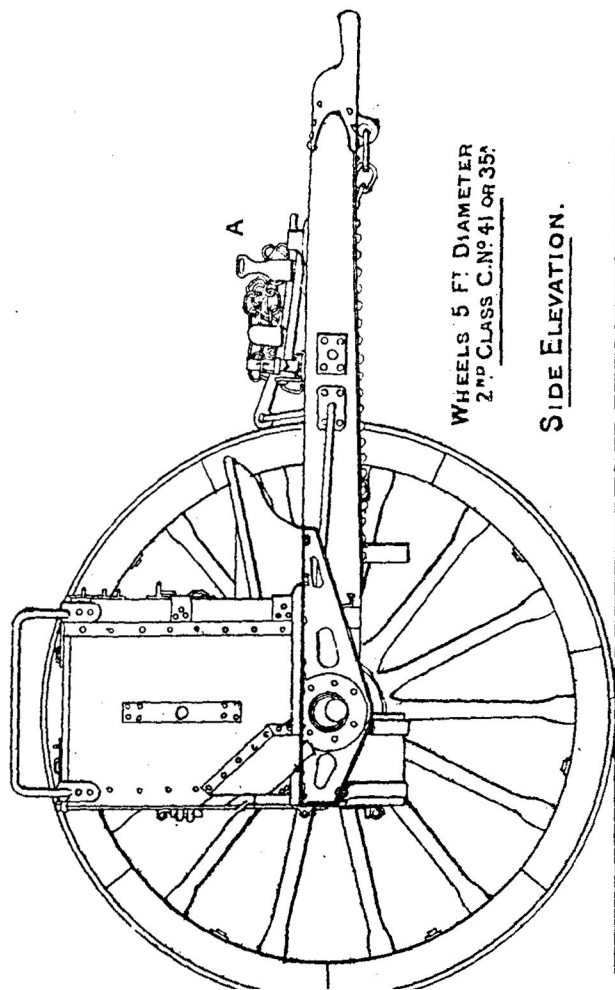


— REAR ELEVATION LIDS —

WAGON

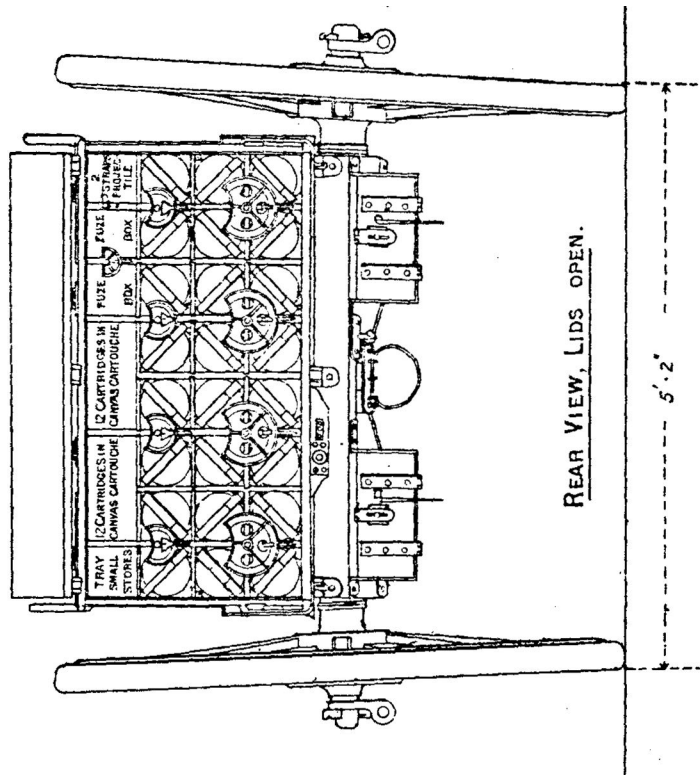
SCALE 1/20.-



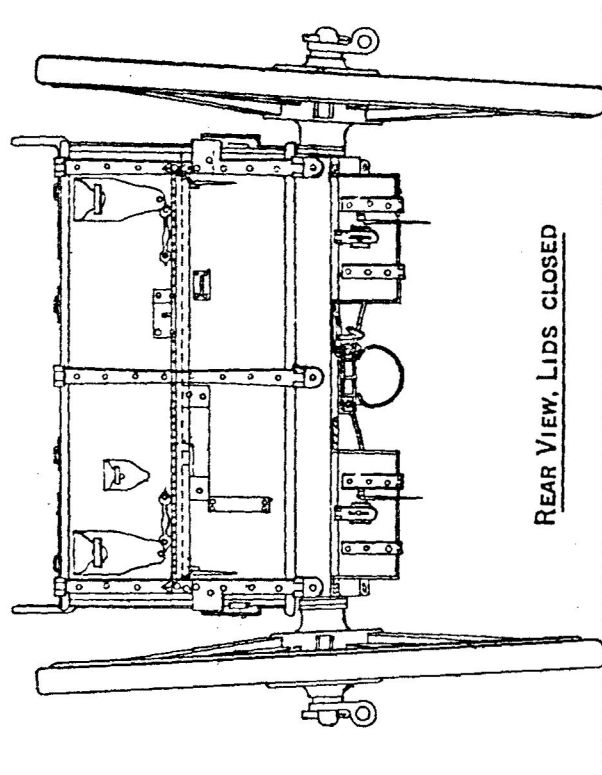


WHEELS 5 FT DIAMETER
2ND CLASS C. NO 41 OR 35^A

SIDE ELEVATION.



REAR VIEW, LIDS OPEN.

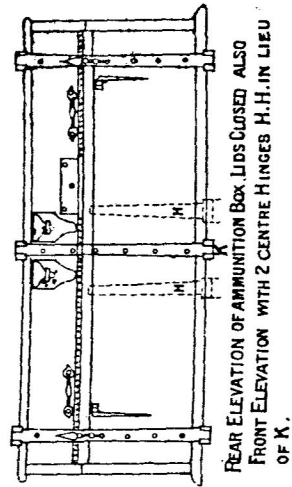
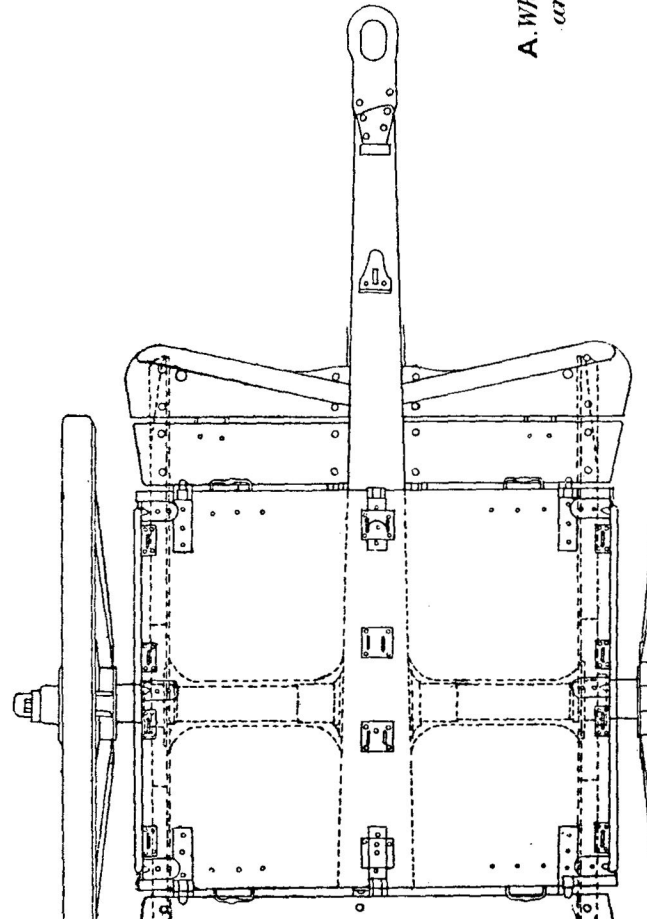
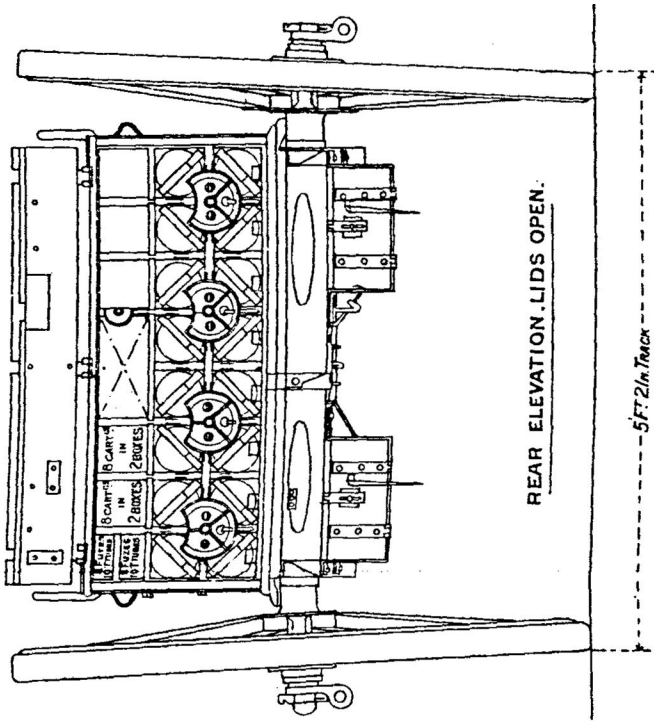
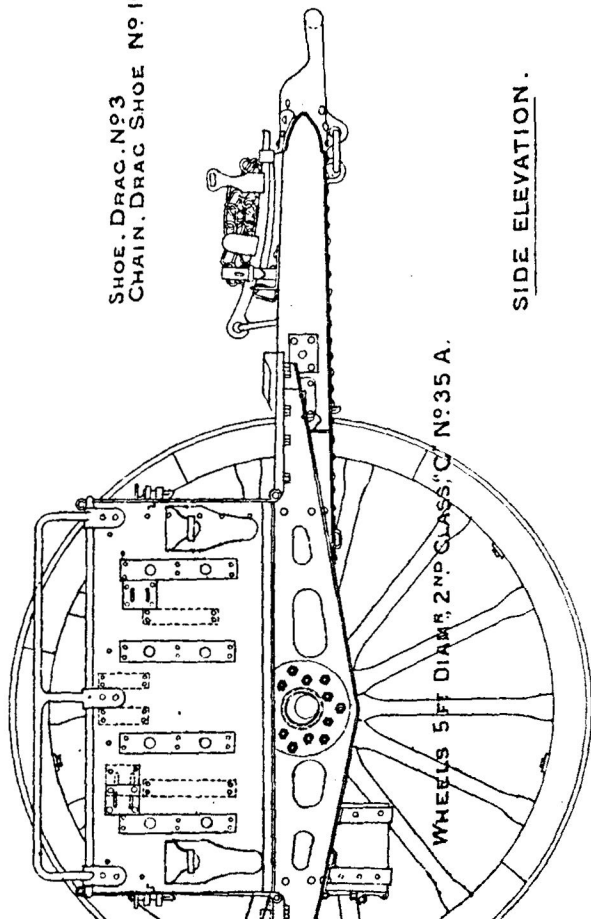


REAR VIEW, LIDS CLOSED

AGON, AMMUNITION, B.L., 5 INCH HOWITZER, MARK I.

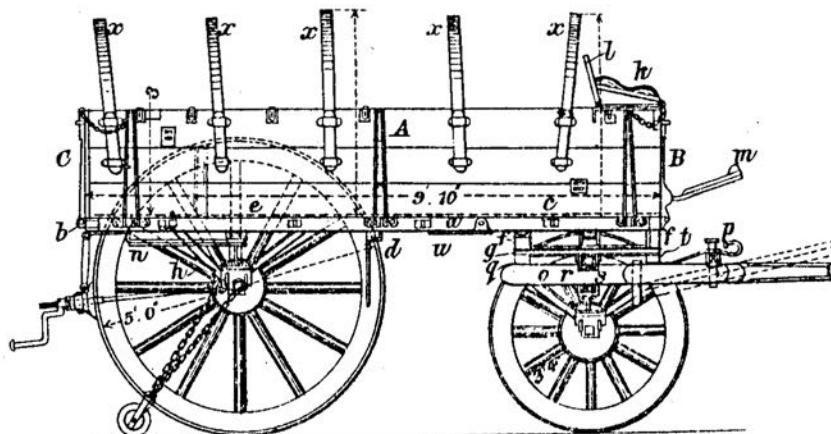
Scale $\frac{1}{20}$ th.

A. When Wagons are fitted with Tire Brakes, the Dragshoe and Chains are not issued.



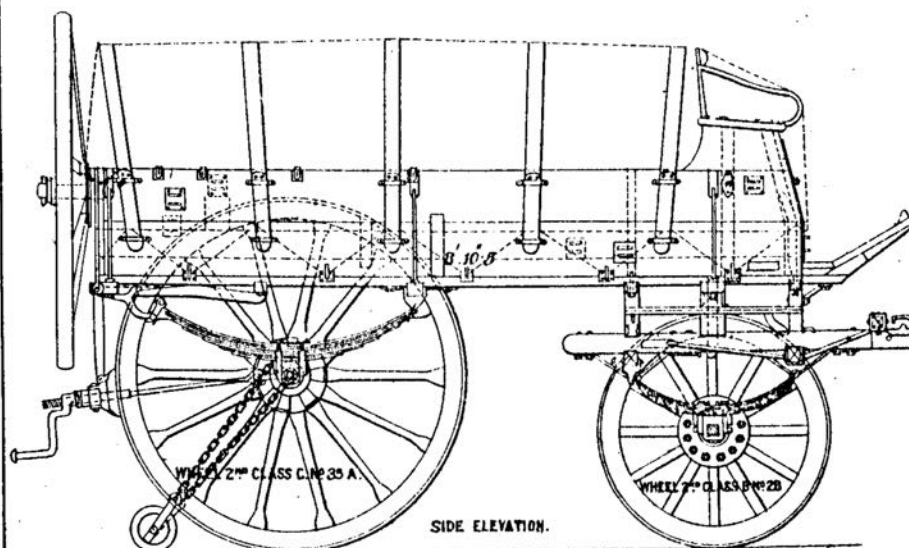
A. When Wagons are fitted with Tire Brakes, the Dragshoe and Chains will not be issued.

WAGON, AMMUNITION & STORE, R. A., MARK II.*



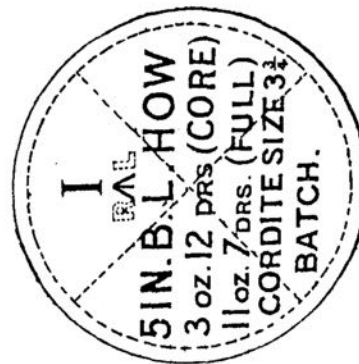
WAGON, AMMUNITION & STORE, R. A., MARK IV.

SCALE 1/32.

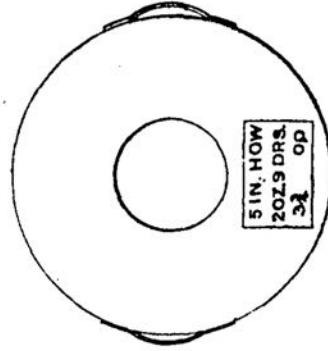
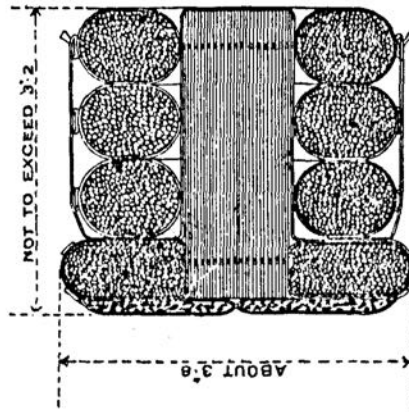


CARTRIDGE, B.L. 5 INCH HOWITZER, CORDITE, 11 7/16 OZ., SIZE 3 3/4, MARK I.

SCALE 1/2



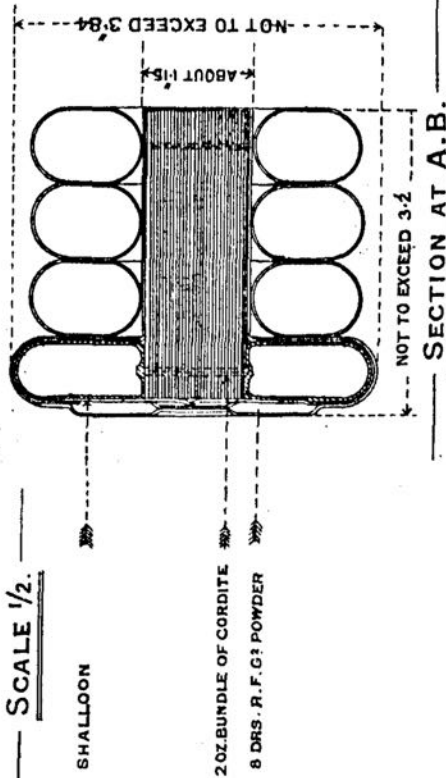
END VIEW OF BASE.



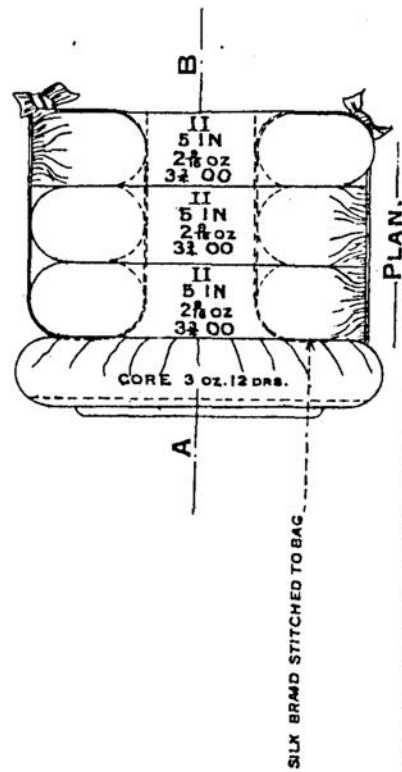
END VIEW OF RINGS.

CARTRIDGE, B.L. 5 INCH HOWITZER, $11\frac{7}{16}$ OZS. CORDITE, SIZE $3\frac{3}{4}$, MARK II.

SCALE $\frac{1}{2}$.



PLAN OF BASE.

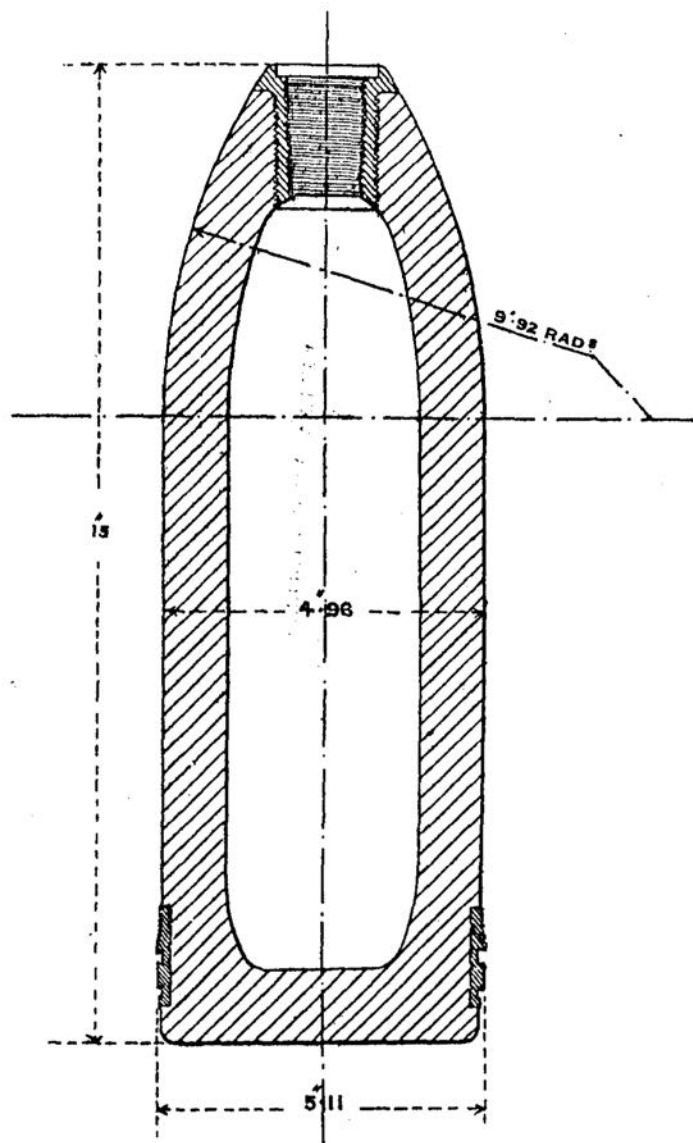


PLAN OF END.

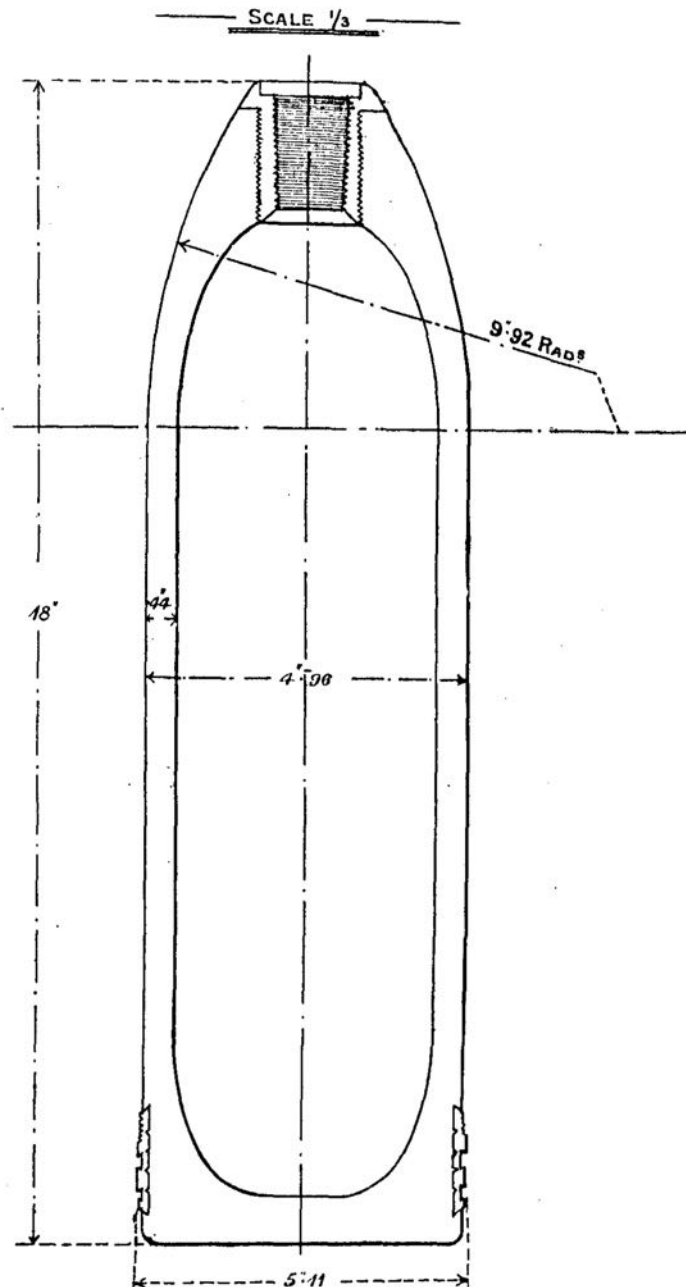
SHELL, B.L. LYDDITE COMMON, 5 INCH HOWITZER, MARK I.

FORGED STEEL.

SCALE $\frac{1}{3}$.

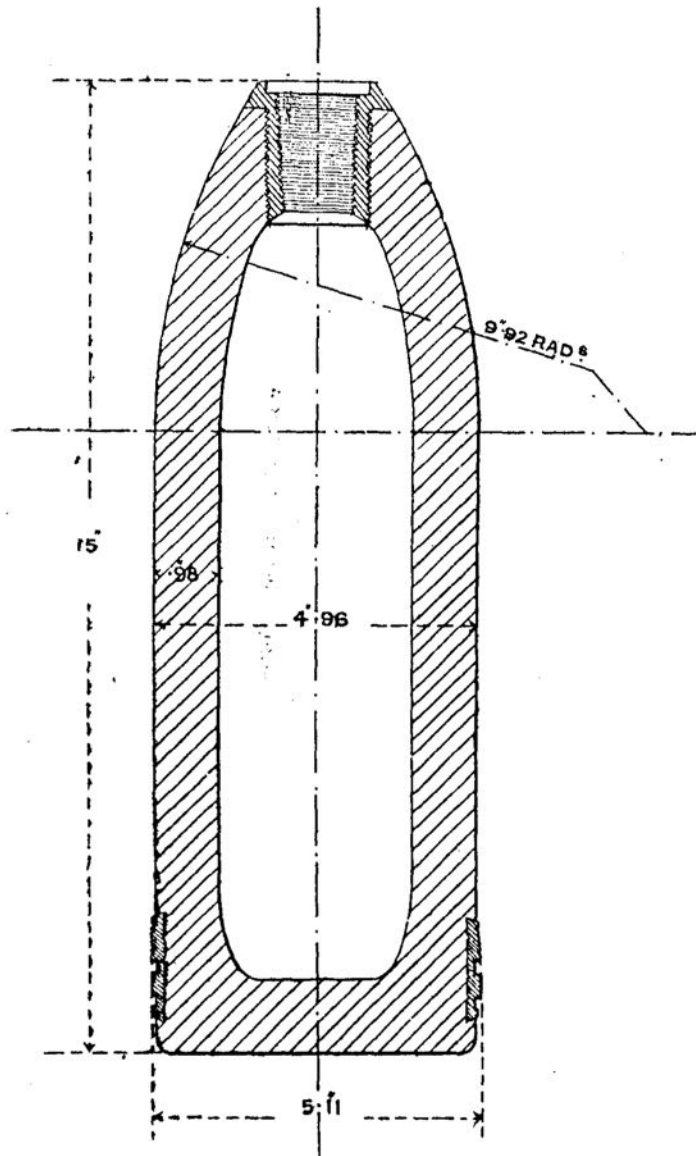


SHELL, B.L. LYDDITE, COMMON, 5 INCH HOWITZER, MARK III.
FORGED STEEL.



SHELL, B. L. COMMON, 5 INCH HOWITZER, IRON, MARK II.

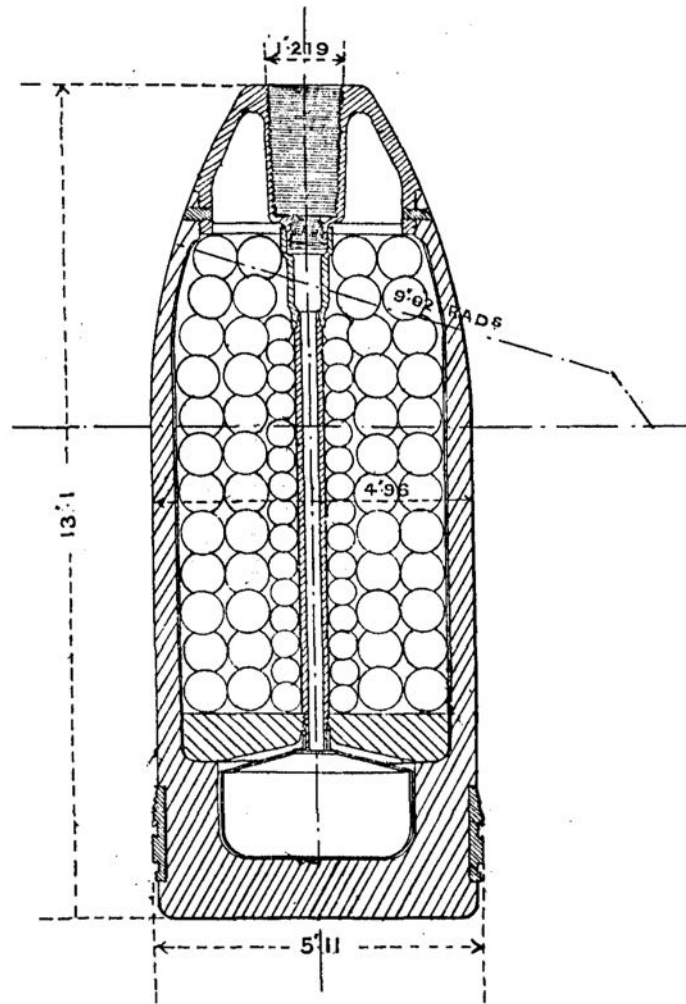
SCALE $\frac{1}{3}$.



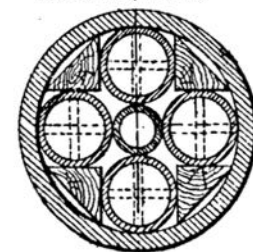
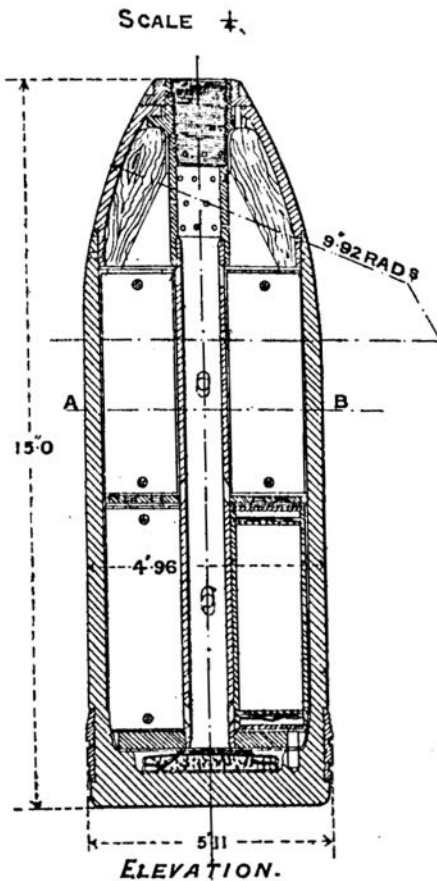
SHELL, B. L., SHRAPNEL, 5 INCH HOWITZER, MARK I.

FORGED STEEL.

SCALE $\frac{1}{3}$.

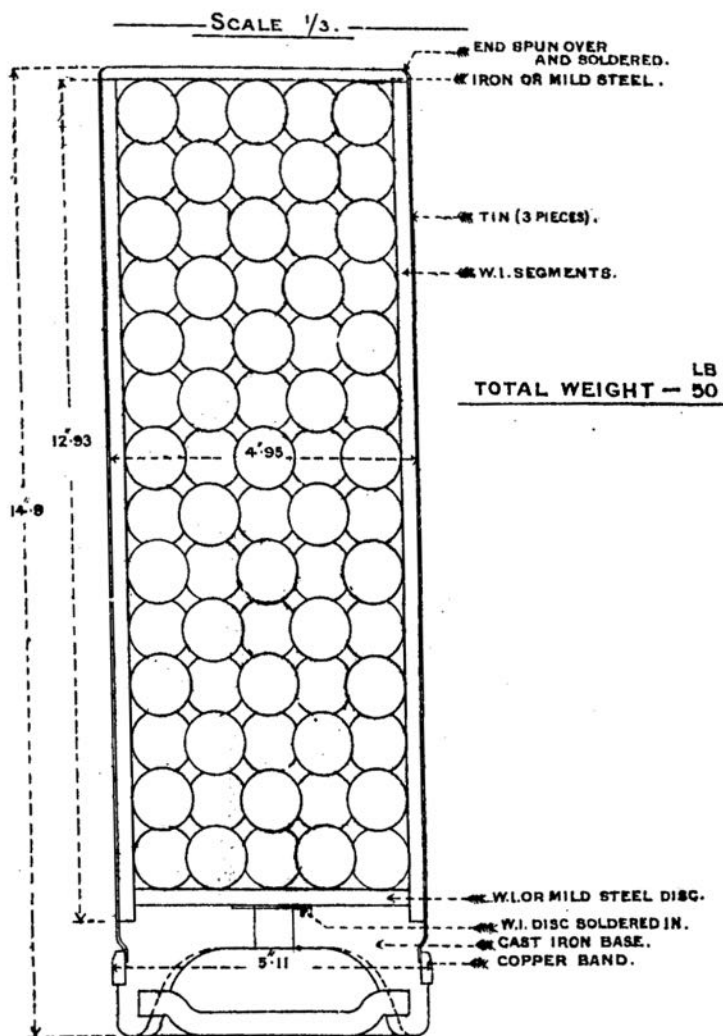


SHELL, B. L. STAR. 5 INCH HOWITZER, MARK II.
FORGED STEEL.



SECTION AT A.B.

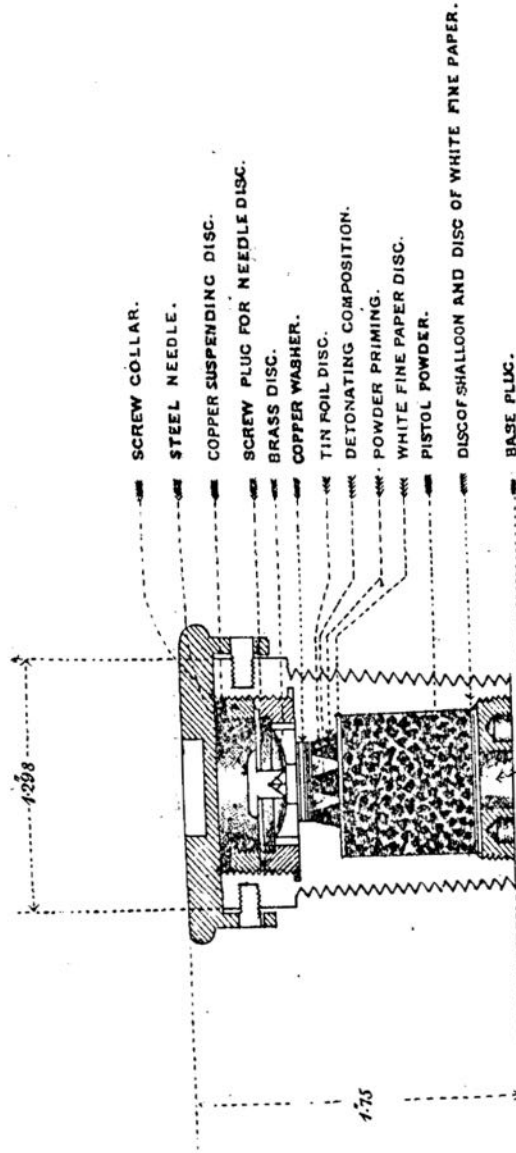
SHOT, B.L., CASE, 5 INCH HOWITZER, MARK II.



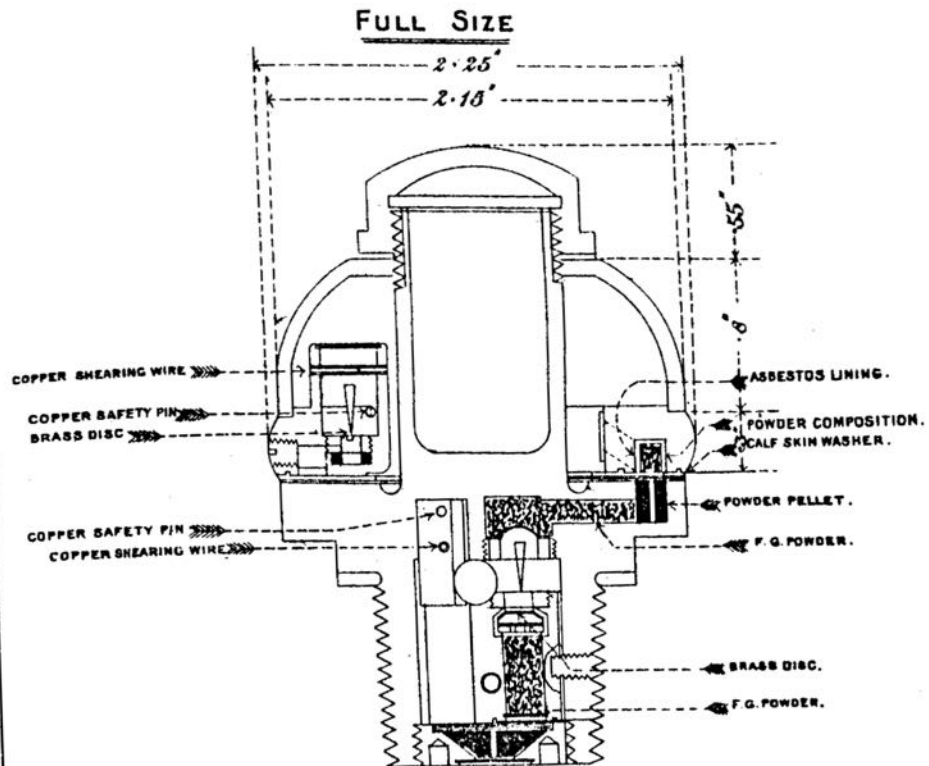
PLAN OF TOP.

FUZE, PERCUSSION, DIRECT-ACTION, N° 1., MARK II.

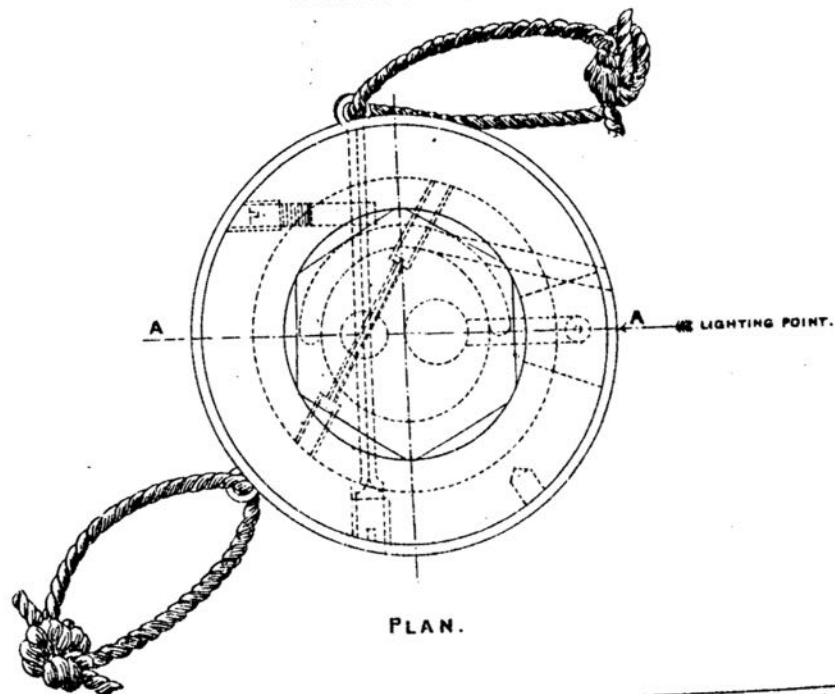
FULL SIZE



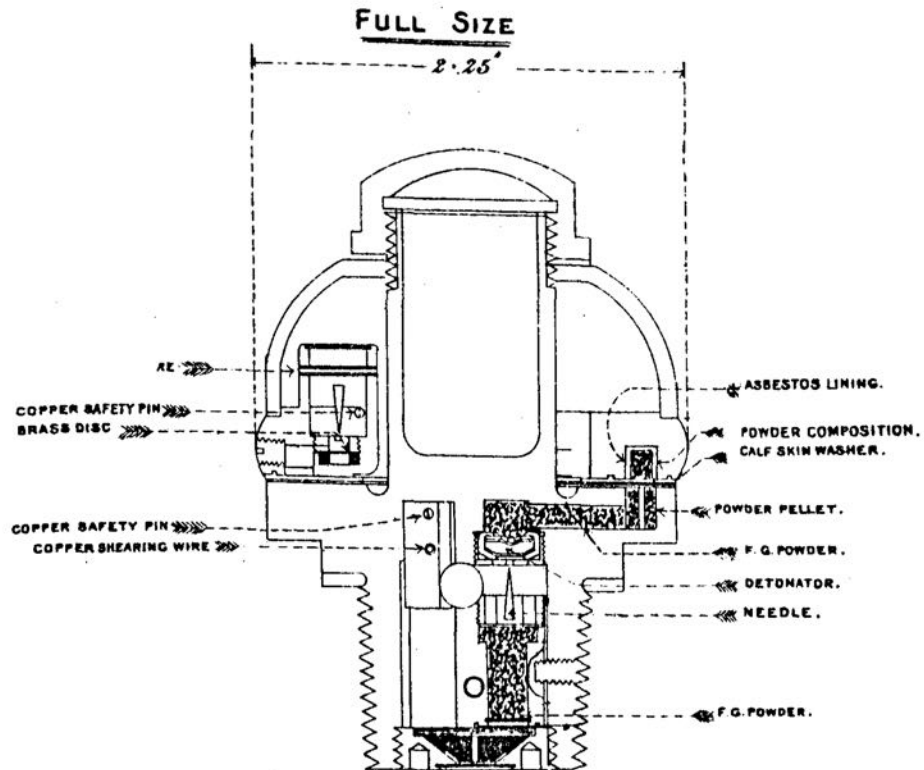
FUZE, TIME AND PERCUSSION, MIDDLE, N°54, MARK II.



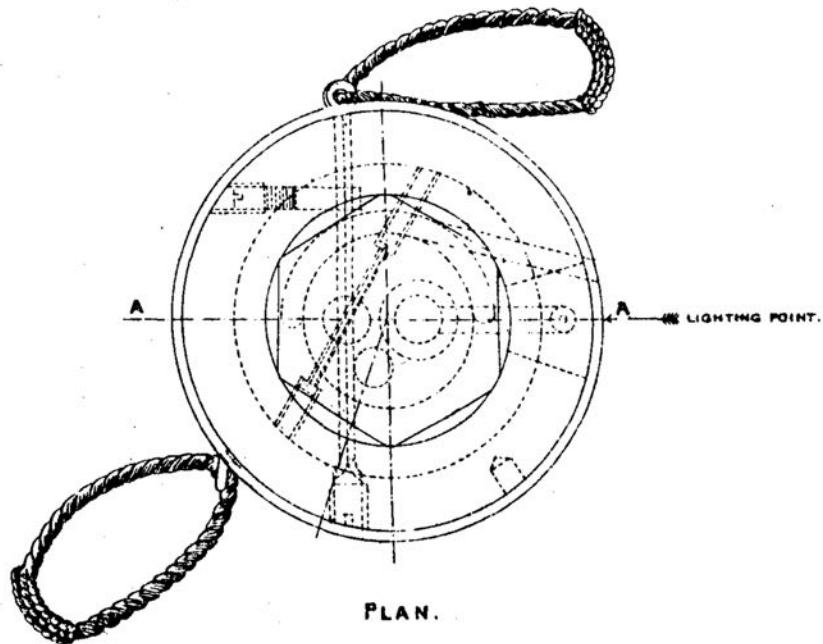
SECTION AT A.A.



FUZE, TIME AND PERCUSSION, MIDDLE, N° 54, MARK III.

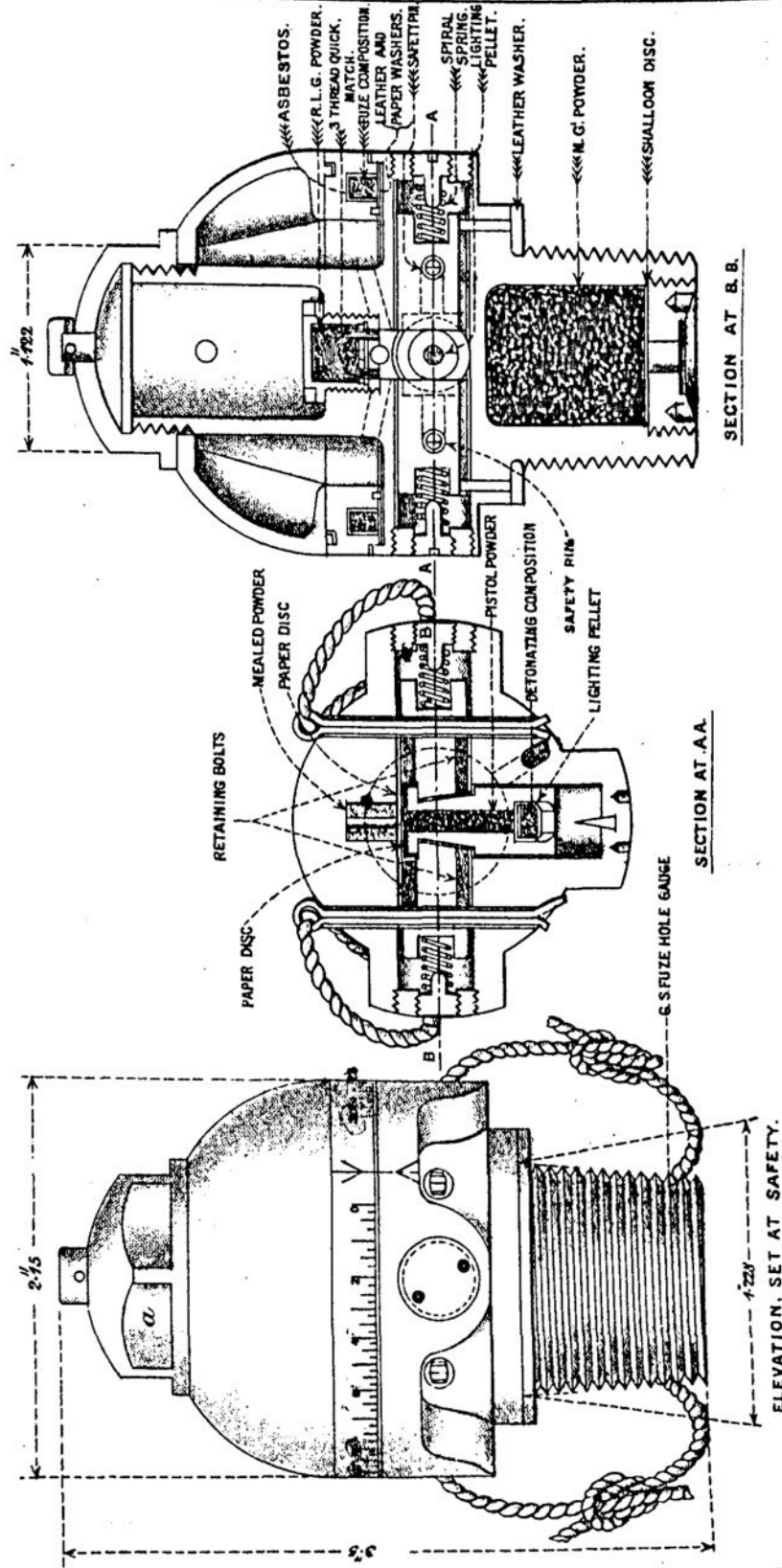


SECTION AT A.A.

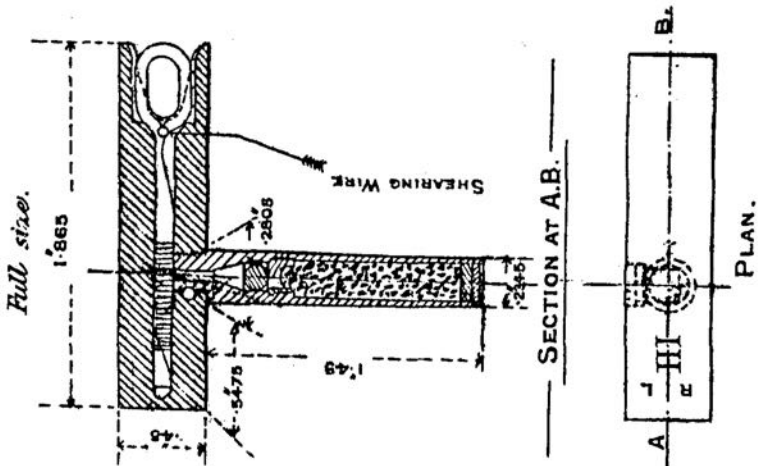


FUZE, TIME, SENSITIVE, MIDDLE, N° 24, MARK I.

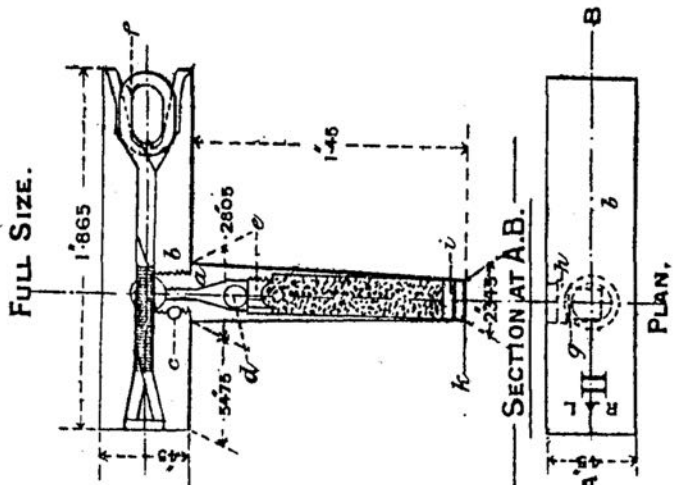
FULL SIZE.



TUBE, FRICTION T, MARK III.

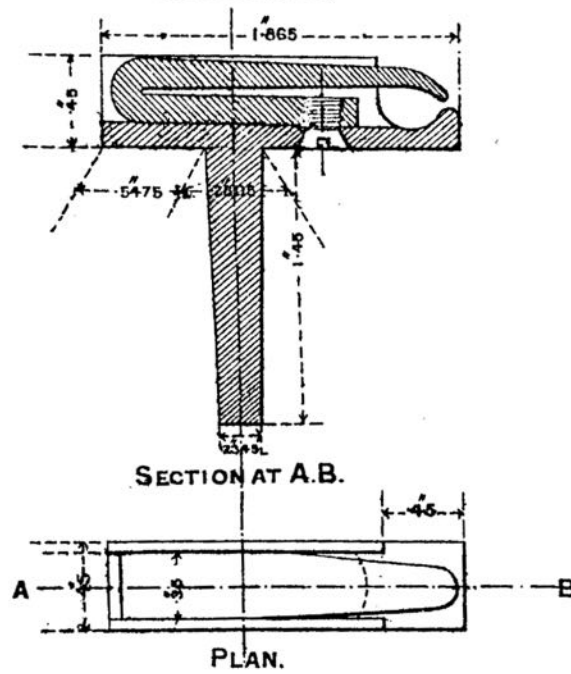


TUBE, FRICTION T, MARK II.



TUBE, FRICTION, T, DRILL, MARK I.

FULL SIZE.



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HANDBOOK

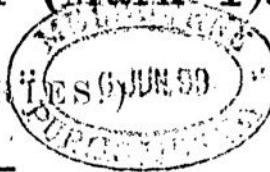
AND

EQUIPMENT DETAILS

FOR THE

5-inch B.L. Howitzer (Mark 1).

(FIELD BATTERY)



1896.



LONDON:

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Note.—This handbook has been corrected up to October, 1896; any alterations which may be suggested should be forwarded to Chief Inspector, Royal Arsenal, Woolwich.

* Will be issued hereafter.



ADDENDA.

HANDBOOK—5-INCH B.L. HOWITZER (MARK I).

At page 21 of the above-mentioned Handbook, in the paragraph headed, "Fixing Plugs and Fuzes,"

Insert against "plugs" in the second line, the symbol † with attendant foot note.

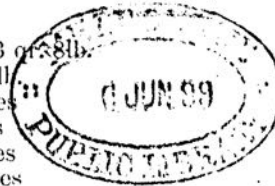
† In cases where plugs are found to be tightly jammed in the shells, the "turn screw" which is fixed to the ammunition boxes should be used to "start" the plugs. Any attempt to extract such plugs solely by means of the "key, fuze, universal," may result in the latter being damaged.

5-inch B.L. HOWITZER (Mark I).

Howitzer.

(Plate I.)

Material	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	Steel
Weight	{ of howitzer, without fittings ..		.. .. .	.. .. .	.. .. .	8 cwt. 3 qr. 5 lb.
	{ of breech fittings ..		.. .. .	.. .. .	.. .. .	3 qr. 5 lb.
Length, total	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	49 inches
Bore	{ calibre ..		.. .. .	.. .. .	.. .. .	5 inches
	{ length ..		.. .. .	.. .. .	.. .. .	42 inches
Chamber	{ diameter ..		.. .. .	.. .. .	.. .. .	5.2 inches
	{ length ..		.. .. .	.. .. .	.. .. .	3.2 inches
	{ capacity ..		.. .. .	.. .. .	.. .. .	77 cubic inches
Rifling	{ system ..		.. .. .	.. .. .	.. .. .	Polygroove, hook section.
	{ length ..		.. .. .	.. .. .	.. .. .	36.8 inches
	{ twist ..		.. .. .	.. .. .	.. .. .	Uniform, 1 turn in 28 cal.
	{ grooves	{ number ..	.. .. .	.. .. .	.. .. .	20
		{ width ..	.. .. .	.. .. .	.. .. .	.6 of an inch
Venting	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	Axial
Obturation	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	Pad



The howitzer is made of steel, and consists of an A tube, over which is shrunk a B tube. Over the B tube is shrunk a jacket, the whole being secured longitudinally by means of shoulders on the A and B tubes, and a steel bush screwed into the B tube and jacket at the rear; the bush is also prepared for the reception of the breech-screw. A breech ring, for attaching the howitzer to the hydraulic buffers, is fitted over the rear portion of the breech bush and screwed to the jacket. The breech ring and bush are prevented from turning, when in position, by a steel stud screwed through the breech ring, and partly into the bush and jacket, at the rear.

The breech ring is furnished with lugs for the attachment of the breech fittings.

Longitudinal projections formed on the sides of the jacket act as guides for the howitzer when in the cradle of the carriage; projections which serve as a plane for clinometer and seatings for the fore-sight brackets, respectively, are also formed on the upper side of the jacket, at the front end.

The chamber is cylindrical, terminating in front with a curved slope.

Breech-closing Mechanism.

(Plate II.)

The breech is closed by a screw having three portions of the screw thread removed longitudinally, each one-sixth of the circumference. The interior of the gun, at the breech, being prepared in a similar manner, admits of the screw, when the raised portions are placed

(5465)

A 2

opposite the smooth surfaces in the gun, being pushed home and locked by the sixth of a turn.

The breech-screw has hinged to it a cam lever, by means of which it is locked and unlocked; the cam portion of the lever (when the breech-screw is locked) falls into a recess in the carrier ring, and so prevents any movement of the breech-screw during firing. In lowering the cam lever after the breech-screw is unlocked, the cam, acting upon the surface of the carrier ring, starts the first movement to the rear of the breech-screw and obturator.

A "catch" is provided on the handle of the breech-screw for retaining the cam lever in the down position.

Encircling the rear end of the breech-screw, and hinged to the breech ring, is a carrier ring which supports the screw when withdrawn.

The carrier ring is held to the gun, during the withdrawal of the breech-screw, by means of a clip, fitted to the left side of the ring, engaging with a recess in a projection on the rear face of the breech ring.

A stop bolt, in the right side of the carrier ring, serves to prevent the breech-screw being disengaged from the carrier ring when withdrawn; at the same time, the clip in the left side of the carrier ring is disengaged from the recess in the projection on the breech ring by means of a spiral spring, which forces the opposite end of the clip into a recess in the breech-screw, thus securing the latter in the carrier ring. When in this position, the whole can be swung clear of the breech opening to admit of loading.

The carrier ring is retained in the loading position by a "latch."

If, when opening the breech, the carrier ring remains fast owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech mechanism wrench in the hole provided for the purpose on the left side of the breech.

Obturator.

The system of obturation consists of a circular pad with protecting discs, fitting the mouth of the chamber, being placed between the mushroom head of the axial "T" vent and the inner face of the breech-screw.

The pad, being slightly elastic, expands radially when compressed by the action of the powder gas, thus sealing the escape.

To prevent play, owing to slightly varying dimensions of the pads, and their becoming compressed by firing, one to four (as required) thin adjusting discs of steel are placed between the rear protecting disc and the face of the breech-screw.

Firing Mechanism.

The firing mechanism is designed for friction firing, with "T" friction tubes.

It consists of a steel axial vent, passing through the longitudinal axis of the breech-screw, having secured to its outer end a head for the reception of the "T" tube. The vent is retained in the breech-screw by means of a spring catch. Fitted to the outer face of the

breech-screw, and encircling the vent head, is an actuating collar, worked by the cam lever and link, by means of which the "T" tube is automatically turned into the firing position, and the vent sealed, when the cam lever is lowered.

The "T" tube is automatically released from the vent and turned into the position for withdrawing, when the cam lever is raised, the tube being withdrawn by hand.

Sighting.

(Plate III.)

The howitzer is sighted upon both sides with crossbar sights.

The tangent sights drop into sockets, and are set vertically. The vertical bars, which are of steel, are graduated to 10 degrees, adjustment being effected by removable clamps. The sights have bronze heads with clamping screws, and a steel horizontal crossbar, which slides within the head to the extent of 1° to the right, and 3° to the left, for deflection. The bar is provided with a sliding reversible leaf, having a notch for direct laying; this leaf is provided with a pointed sight for rough laying, and cross wires for fine laying, when used reversed. The bar is graduated from 0 to 6 right, for the right side, and 6 to 0 left, for the left side. The bars are reversible, being graduated upon one edge for the right side, and on the opposite edge for the left side of the piece, and are stamped accordingly.

The foresights are of the drop pattern, and consist of a steel stem with horizontal half crossbar (forged solid), a jacket and socket. The bar is fitted with a sliding reversible leaf, having a point, for use with the notch of the tangent sight, for direct laying, and a notch and eye-hole, for rough and fine laying, when used reversed. The socket is permanently fixed in the fore-sight bracket, one of which is fitted, on each side of the clinometer plane, on the chase of the howitzer, and secured by means of a dovetail and fixing screw. The stem locks into the socket with a bayonet joint, and is prevented from turning by a projection, on the jacket, which drops into a recess in the socket when the sight is in its true position. The sight cannot be removed without first raising the jacket and turning the stem round a quarter of a circle.

The sights are left and right, the horizontal half crossbars being graduated from 0 to 6 right, for the right side, and 6 to 0 left for the left side, respectively, to correspond with the graduations on the crossbars of the tangent sights.

The method of using these sights is explained in the drill.

CARE AND PRESERVATION OF HOWITZERS AND FITTINGS.

The howitzer should be examined after firing 50 rounds with projectiles. When it is found that the "T" vent in the howitzer is not fit to last for the number of rounds remaining before the next examination of the howitzer is due, the vent will be condemned.

The breech fittings should be kept clean, oiled or greased, and in good working order; all working surfaces must be well lubricated, the fittings being taken off sometimes for this purpose, especially after firing.

To lubricate the hinge bolt of the carrier ring without removing the fittings, the small screw on the top of the hinge bolt should be removed, and oil poured into the channel, taking care to replace the screw after oiling.

All fittings of the howitzer should be treated with care; violence and jerks should be avoided, and no unnecessary force should be employed.

The breech fittings should work easily, and be free from cracks and burrs; the latter can be removed by filing, but this must be done carefully so as not to permanently damage the fitting. Should a crack be observed in a breech fitting, it should be exchanged.

The threads of the breech-screw should be free from burrs; should the breech-screw not work easily, when the obturator has been detached, the defect may often be remedied by careful filing, but no portion of the thread should be cut away to remove a crack.

On the line of march, the breech should be kept covered by the canvas cover provided for this purpose, to prevent dust and grit getting into the interstices of the breech fittings.

Abbreviated headings of the necessary information, required for laying the piece, are stencilled on the cradle and chase of the howitzer, as shown on Plate IV., which should be strictly adhered to in renewing the lettering.

DE BANGE OBTURATOR.

The obturator consists of a mushroom-headed axial "T" vent of steel, passing through the longitudinal axis of the breech-screw, with a pad and pair of metal discs. The inner face of the breech-screw is flat, and, between it and the head of the axial "T" vent, the pad and discs are arranged. The pad is made of asbestos, worked up with mutton suet to a proper consistency, and enclosed in a strong canvas cover; it is reduced to shape, and pressed in a hydraulic machine, and afterwards subjected to higher pressure in the howitzer by firing heavy charges at proof. The pad is enclosed between two tin discs, the outer angles of which are protected by steel rings. The howitzer is slightly coned at the seat of the obturator when pushed home, and the pad is provided with a corresponding taper to insure a good fit.

In putting the obturating pad and discs on to the head or vent axial, first place the front protecting disc, with its rounded side fitting the back of the mushroom head, then the pad with that side to the front which is curved to fit the front disc, the stitched side being to the rear; then the rear protecting disc, and in placing this, its flat side and bronze ring with which it is bushed, should be on the opposite side to the pad.

If correctly assembled, the whole should fit together compactly.

Should there be any play between the obturator and the face of the breech-screw, one or more adjusting discs are placed behind the protecting disc.

The pads and discs issued on the breech screw with a howitzer have always been previously expanded in that howitzer, but the first time any other pad is used, it must be with a shotted round.

Action.

When the breech-screw is pushed into the howitzer, the obturator enters the chamber with perfect ease; on turning the breech-screw, the obturating pad is pressed home into the coned seat in the howitzer.

by the travel of the screw. The bore is thus perfectly closed by a species of buffer in contact all round the circumference, while the head of the axial "T" vent receives the force of the gas on discharge. On firing the howitzer, the pressure acts on the head of the vent, and compresses the pad against the breech-screw, causing it to expand laterally; from symmetry of form and position, this expansion must be radial to the axis and equal in every direction, and is sufficient to prevent the escape of the gas. On the pressure being removed, elasticity comes into play, and the obturator can be withdrawn from the cone by a straight pull, which can be given as soon as the screw is unlocked.

The pads are almost indestructible, except, perhaps, from the wear of opening and closing the breech; but, if the firing is rapid, they may get softened by heat; in this case, the pad should be changed and thrown into cold water for a time, when it will soon be restored to good condition again. Spare pads are provided, and also steel adjusting discs, which should be inserted between the rear protecting disc and the face of the breech-screw if the pad becomes compressed by firing, but in all cases the obturating pad and discs should turn freely on the breech-screw.

The outer canvas of the obturating pad should be free from rents; small bruises likely to be removed by the pressure of firing are of no importance.

If the pad is not in good order, or there are too many adjusting discs behind the pad, stiffness in working the breech will probably result. The obturating pad should be rubbed occasionally with Russian tallow mixed with oil, or some other suitable lubricant; and the pad, with protecting discs, should be carefully handled to prevent them being indented or bruised.

The obturating pads and discs should be kept complete on the axial "T" vent in the howitzer, or in the boxes provided for the purpose, as there is a tendency of the pad to swell in the direction of its axis, which might cause difficulty in adjusting it on the breech-screw.

When the obturator is attached to the breech-screw, the removal of the latter from the carrier ring should be done by two persons, as care is necessary to keep the "clip retaining carrier ring" withdrawn clear of the breech-screw, before drawing the latter back, to avoid damaging the obturating pad and discs. The obturator should, however, always be detached, when possible, from the breech-screw, before removing the latter from the carrier ring.

Clip, retaining Carrier Ring.

If, when opening the breech, the carrier ring remains fast, owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech-mechanism wrench in the hole provided for this purpose, on the left side of the breech, and tapping the wrench with a hammer.

To Remove the Breech Fittings.

Before removing the fittings, the breech should be opened, the breech-screw being swung into the loading position.

Obturator.

Press down the lever of the catch in the breech-screw, which retains the axial "T" vent; the vent can then be withdrawn from the front of the breech-screw, and the obturating pad and discs removed from the vent.

Breech-screw.

When the breech is open, the breech-screw is held in the carrier ring by a stop bolt on the right, and by the retaining clip of the carrier ring on the left. By withdrawing the retaining clip from the breech-screw, and holding it back, the breech-screw can be moved forward and the stop bolt pushed out from behind; the breech-screw can then be withdrawn from the carrier ring, the retaining clip being held back until the breech-screw is clear of the ring.

Carrier Ring.

The carrier ring is attached to the breech by a hinge bolt and keep pin; in order to remove the keep pin, the "latch retaining carrier ring open" must be pressed down, and the carrier ring placed in such a position as will admit of the keep pin being knocked out. When this is done, the hinge bolt can be removed, and the carrier ring withdrawn from the breech.

Clip, retaining Carrier Ring.

The retaining clip is actuated by a spiral spring, and retained in the carrier ring by means of a set screw; on the removal of the set screw, the clip and spiral spring can be withdrawn from the ring.

Cam Lever.

Take out the keep pin of the hinge bolt, when the latter can be removed, and the cam lever withdrawn.

Link, Actuating Collar.

Unscrew the axis pin of the link, and withdraw the link.

Collar, Actuating.

Turn the actuating collar until the indicating arrow on the collar corresponds with the arrow and the word "enter," engraved on the outer face of the breech-screw, when the collar can be withdrawn.

Catch, retaining Vent Axial.

To remove the catch, it must be pressed outwards by means of a piece of wood or a screwdriver, used as a lever in the interior of the

breech-screw, until the axis pin can be removed by means of a screw-driver, and the lever and catch with spiral spring, withdrawn from the breech-screw.

Catch, retaining Cam Lever.

To remove the catch retaining cam lever of a certain number of the first issue of those howitzers, it is necessary first to remove the handle of the breech-screw. This is done by taking out the two fixing screws of the handle, and withdrawing the latter from the breech-screw. The catch with lever and spiral spring can then be removed from the handle by taking out the axis pin of the lever of the catch.

In howitzers of later manufacture, the handle is altered to afford more clearance for the hand of the number working the breech; and the breech-screw is modified so as to admit of the catch retaining cam lever being removed without taking off the handle of the breech-screw.

Latch, retaining Carrier Ring Open.

To remove the latch, press it down until the guide screw is at the bottom of the slot, then unscrew the guide screw, and remove it when the latch and spiral spring can be withdrawn.

To Re-assemble the Breech Fittings.

The converse of the above action takes place in re-assembling the fittings on the howitzer.

Care must be taken when placing the axial "T" vent and obturating pad and discs in the breech-screw, to see that the indicating arrows engraved on the mushroom head of the axial "T" vent, and the front end of the breech-screw, correspond, as it is in that position only that the catch in the breech-screw, for retaining the obturator, will engage with the recess for its reception in the axial "T" vent.

In placing the actuating collar in position in the breech-screw, the indicating arrow on the collar must correspond with the arrow and the word "enter" engraved on the outer face of the breech-screw. When the collar is placed in the breech-screw, it must then be turned until the indicating arrow corresponds with another arrow with the words "engage link" on the breech-screw, before the link of the actuating collar is placed in position.

Rifles, Aiming, M.H. Chamber, Ewart, B.L. 5-inch Howitzer.

This apparatus is for use with the howitzer in imparting instruction in laying, and consists of the following parts:—

Rifle, aiming, M.H. Chamber, Ewart—					
*Band	..	..	..	..	bronze, with hinge pin, collar and keep pin, and securing screw.
Barrel, rifle	..	..	..	..	M.H. rifle barrel with breech action and metal boss.
*Bracket	..	..	..	..	bronze, with key, buffer and fixing screw.
Cord, firing	..	..	..	..	white line, tarred, 2 yards long with 2 hooks.
Link, trigger	..	..	..	..	bronze, with fixing screw.
Tube, aiming, M.H. rifle	..	..	..	..	including breech piece, bushes (movable and fixed), set nut and leather washer.
Tube, aiming, 0.23-inch—					
Brush, cleaning.					
Key, M.H.					
Rod, cleaning.					

* Special to the howitzer.

Method of Fitting, Adjusting, and Using the Apparatus.

The aiming rifle is fitted to the upper left side of the howitzer in the following manner:—

The band is placed over the exterior of the chase of the howitzer, and secured in position by a securing screw. The bracket is fitted to the upper part of the breech ring, and secured by a fixing screw. The distance between the inner faces of the bracket, and band, when in position, is 27 inches. The muzzle of the rifle is passed through the hole in the arm projecting from the front band, and the breech is placed in the socket in the bracket, and fastened with a key. A buffer spring, to lessen the recoil, fits into the socket in rear of the rifle. A hole is made at the rear end of the socket to facilitate the extraction of the buffer spring.

To adjust the rifle on the howitzer, the latter is laid on a mark and the rifle placed as near as possible parallel with the vertical plane of the piece, the band and bracket will then be firmly screwed up and a trial shot taken. Should the rifle be much out of line, the front band will require to be slackened and moved round the chase in the required direction, but any slight error in line will be corrected by use of the deflection scale.

Elevation is obtained by means of the howitzer sights.

The rifle is fired by means of the firing cord, which is attached at one end, by means of a hook, to the loop of the trigger link, the other end of the cord being led round the removable clamp on the tangent sight, on the left-hand side of the howitzer, to the firing number.

DESCRIPTIONS OF CARRIAGES, LIMBERS, AND WAGONS.

Carriage, field, B.L., 5-inch, howitzer, Mark I.
 Limber, field, B.L., 5-inch, howitzer, Mark I.
 Wagon, ammunition, B.L., 5-inch, howitzer, Mark I.
 Wagon, forge, R.A., Mark III.
 Limber, wagon, forge, R.A., Mark III.*
 Wagon, store, R.A., Mark II.
 Limber, wagon, store, R.A., Mark II.*
 Wagon, ammunition and store, R.A., Mark II.*
 Wagon, Artillery, Mark I.*

Carriage, Field, B.L., 5-inch Howitzer.

(Plate V.)

The carriage consists of two side brackets, a trail eye, a cradle with hydraulic buffers and running-out springs, elevating gear, shoe brakes, an axletree with 2nd class arms, and two field wheels.

The side brackets are of steel plate, connected by top and bottom plates, transoms, and a trail eye. Bearings are formed in the upper part of the brackets to take the trunnion arms of the cradle. The cradle is held in position by cap-squares, which are hinged at their lower ends to the side brackets and secured at their upper by keys. A hole is cut in the right bracket for the lanyard to pass through when firing at extreme angles of elevation.

The trail eye (No. 24), is of wrought iron, the eye being fitted with a movable piece of hard steel.

The cradle is in one casting, of steel, with trunnion arms to pivot it to the carriage brackets; it has an opening in the centre, recessed at each side in which the howitzer slides on recoil, and three cylindrical openings at each side, the centre one for a hydraulic buffer, and the upper and lower for running-out springs. Each buffer, which is connected by a pipe to equalize the pressure, consists of a steel tube, a piston with rod, and controlling rod, a rear gland, and a front plug.

The hydraulic buffer tube, which is closed by the rear gland and the front plug, is formed at the rear into a stuffing-box, to take cotton packing. The piston rod, which is fitted with a metal ring round the periphery of the piston to prevent seizure, passes through the rear gland, and is connected to a projection on the breech ring of the howitzer. The upper and lower openings are each fitted to receive two running-out springs, which are held under initial compression on a nut bolt; the rear end of each nut bolt is connected to a projection on the breech ring of the howitzer. The bore of the buffer tube is slightly tapered so that the space around the periphery of the piston may form a varying orifice for the flow of the liquid; by this means an approximately constant pressure is maintained in the buffer throughout the stroke. The controlling rod of the piston fits into a recess formed

in the front plug, so as to form a small hydraulic cushion, which prevents injury to the buffer by concussion caused by the return of the howitzer.

On firing, the piston rods, and nut bolts carrying springs, are drawn out of the cylinders, thus checking the recoil, and further compressing the running-out springs; the energy thus stored up in the springs returns the howitzer to the firing position. The howitzer recoils about $5\frac{1}{2}$ inches in the cradle, during which the motion is gradually imparted to the whole structure, thus lessening the strain upon it due to firing.

The elevating gear, which is attached to the right side of the carriage, is actuated by a handwheel, which transmits motion through mitre wheels and spindle with worm, to an elevating arc segment, attached to the trunnion arm of the cradle. When travelling, the handwheel is strapped to the tensile stays.

The brake consists of two brake or drag shoes, two drag-shoe or brake-shoe chains (No. 19), two sets of suspending chains, and two drag-washers with "Q" link. The brake shoes (which are in one steel forging with the sides splayed out to the front) are attached to the sides of the carriage, near the trail eye, by the No. 19 chains; the inner sides are connected by the suspending chains to the axletree, and when in use, the outer sides are connected with the drag-washers. The drag-washer has a loop for use with the drag-rope, and on the opposite side, a "Q" link, or sliding hinged hook, similar to that used for traces.

In action, the shoes are placed on the ground, behind, and against the wheels, and the outer suspending chains are connected to the drag-washers. On recoil, the wheels of the carriage run on the shoes, the chains being linked up to a sufficient length to ensure the wheels riding on the shoes during recoil. On running up, the wheels leave the shoes, which remain in position for the next recoil. When not in use, the shoes and outer chains are hung on hooks fixed to the rear of the axletree for the purpose. The brake shoe is turned over before hooking up, and the end link of the outer chain is slipped on the hook before the shoe is hooked up.

The brake shoes, which are also used as travelling drag shoes when required, are fitted with hardened steel soles, and designated "Shoe drag, No. 8." When travelling, the drag-shoe chains are linked up to a suitable length, and the shoes hung on hooks fixed to the front of the axletree.

The axletree, which is 2nd Class, "C," No. 204, passes through octagonal holes in flanges which are attached to the side brackets; it is also connected to the side brackets by two tensile stays.

The wheels are 2nd Class, "C," No. 41, 5 feet in diameter, double spoked with a 3-inch tire and removable pipe-box. The nave consists of two metal flanges connected by 14 bolts; the pipe-box passes through the flanges, and is secured to the inner flange by a $\frac{3}{4}$ -inch bolt with nut. A feather is fitted to the pipe-box, which engages the inner flange, and prevents the box turning.

The carriage is furnished with locking plates, and fitted to carry a leather box (containing 1 claw-hammer, 1 pair of pincers, 1 McMahon spanner, 1 spoke brush, 1 hydraulic buffer spanner No. 77, and 1 spanner filling plug No. 79), a piassaba brush and stave end, a traversing hand-spike No. 1, two aiming posts, a No. 9 oil can, a fuze key in pocket, 2 water buckets, a tube pocket, a rimer vent "T," a rod vent, and a bit vent.

When in action, the tampeon is strapped to the right of the axletree.

The method of packing the above stores is shown on packing diagram "A."

Limber, Field, B.L., 5-inch, Howitzer.

(Plate VI.)

The limber consists of a steel frame, a limber hook, a 2nd class axletree, a pole with draught chains, and pole bar, two swingle-trees, an ammunition box, and two field wheels.

The frame consists of four futchels, connected by front and diagonal stays, a platform and a footboard is fitted to the top, and draught hooks for the swingle-trees, to the front of the outer futchels; the footboard is raised by wood blocks 7 inches above the platform board.

A wrought-iron limber hook (No. 12), with movable steel, is riveted to the inner futchels.

The axletree (No. 205), is a weldless steel tube with 2nd class arms; it is secured by pins to flanges, which are attached to the futchels.

The pole draught consists of a pole (12 feet 7 inches long), two No. 7† swingle-trees (2 feet 4 inches long, fitted in the centre, and at each end, with a steel socket having a loop, No. 2 a supporting bar (3 feet 2½ inches long), with a steel socket, with loop at each end, and two No. 2, draught chains each about 2 feet 10½ inches long, with a ring at one end, and a "Q" at the other.

The ammunition box, which is of wood, is fitted with guard irons, and opens at the rear. The rear of the box is in two parts, hinged to the top and bottom, respectively. In opening the box, the upper part is moved upwards, and the lower part downwards; and the latter, when down, serves as a shelf for fuzeing shell when required, and is prevented from falling below the horizontal position by means of stop plates and stops, which are attached to it, and to the sides of the box. The box is divided internally into four tiers of compartments, the three lower to carry, horizontally, a supply of common and shrapnel shell, and case shot, and the upper to carry two cartouches (for 15 and 6 cartridges, respectively), two fuze boxes No. 23 (containing fuzes and "T" tubes), and two wood trays (an upper and lower) marked "B" and "A," respectively, for gun-fittings, &c. The shrapnel and common shell and fuze boxes are held in position by metal discs, and the case shot by hooks.

The wheels are of the same pattern as those issued for the carriage.

The limber is fitted on the "Off" side, at the rear, with a box to carry a "large" clinometer, and on the "near" side, with a plate to carry a No. 3 lubricating can,§ and a 3lb. grease box. Fittings are provided on the "near" side of footboard for a steel box, arranged to carry a vent axial and a box for obturating pads and discs.

The limbers are also fitted to carry various stores as shown in packing diagram "A."

One limber, per battery, will be fitted with loops for kicking straps.

Ammunition, Wagon, B.L., 5-inch Howitzer.

(Plate VII.)

The wagon consists of a steel frame, a hollow box perch fitted with trail eye, a travelling drag shoe, an ammunition box, a 2nd class axletree, and two field wheels.

The frame consists of two flanged sides connected by channel stays; a footboard, raised by wood blocks, is fitted to the sides and perch in the front, and on the under side, at the rear, two wood boxes are attached by bands, each carrying a 14lb. magazine grease-box.

The perch which is riveted to the frame and connected by two stays, is made of steel plate; it is fitted with a perch eye (No. 9) with movable steel, locking plates, and with a loop for the attachment of the drag

† No. 10 for future manufacture.

§ This lubricating can is issued for carriage limber only.

shoe (No. 3) and chain (No. 18). The drag shoe, when not in use, is carried on the top of the perch, and secured by a leather strap.

The ammunition box is generally similar to that described for the limber, but differs slightly in the internal arrangement. The three lower tiers are fitted for shrapnel and common shell only, and the top tier for two cartouches (each carrying 12 cartridges†), three No. 22 fuze boxes (containing fuzes and "T" tubes), and a wood tray for small stores.

The axletree, No. 38, is of weldless steel tube, with 2nd class arms; it is held in flanges, which are secured to the sides, and perch.

The wheels are the same pattern as those for the carriage and limber.

On the footboard, fittings are provided for carrying, on "near" side, a box for bull's-eye lantern, and in the centre, for a box* for firing key.*

The wagon is also fitted to carry various stores as shown in packing diagram "A."

Dimensions, &c.

	Carriage and Limber.		Wagon and Limber.	
	ft.	in.	ft.	in.
Height to axis of Howitzer	3	7	—	—
Length { carriage and { with howitzer	24	0½	—	—
of { limber { without howitzer	23	6	—	—
of { wagon and limber	—	—	22	5
axletree	6	2	6	2
Length between axletrees	8	2½	7	2½
Greatest projection beyond track of wheels ..	0	6	0	6
Maximum width	6	2	6	2
Wheels { track	5	2	5	2
{ diameter	5	0	5	0
Space required to turn in	32	6	29	0
Angle of trail	21½°	—	—	—
of { lock	50°	—	65°	—
Upsetting angle	35°	—	31°	—
Elevation, maximum	45°	—	—	—
Depression	5°	—	—	—
Tonnage { for shipment	6.487 tons		6.65 tons	
{ for transport in boats	12.44 "		12.27 "	
Rectangular space occupied in boats	15' 3" x 6' 2"		15' x 6' 2"	

Weights, &c.

(Packed, and with personal equipment.)

	Carriage and Limber.			Wagon and Limber.		
	cwt.	qr.	lb.	cwt.	qr.	lb.
Carriage and Limber	48	2	0	—	—	—
Wagon and Limber	—	—	—	51	0	0
Carriage and { weight on two fore wheels ..	26	1	0	—	—	—
Limber { " " hind "	22	1	0	—	—	—
Wagon and { weight on two fore wheels ..	—	—	—	25	2	0
Limber { " " hind "	—	—	—	25	2	0
Carriage (trail on ground)	23	0	0	—	—	—
Limber, without { carriage	22	1	0	—	—	—
detachment { wagon	—	—	—	22	0	0
Wagon (perch on ground)	—	—	—	23	0	0
Weight at end of pole, limbers	0	1	20	0	1	27
Pressure of perch on ground, wagon	—	—	—	1	3	0
" trail " carriage	2	1	0	—	—	—
Wheel, No. 41	2	0	0	2	0	0

* Issued for siege purposes only.

† These will contain 15 cartridges, if required.

Wagon, Forge, R.A., Mark III.

Limber, Wagon, Forge, R.A., Mark III.*

The wagon consists of a frame of angle steel, a steel perch, a tubular axle-tree, and two field wheels.

The frame is fitted to carry four wood boxes, and a "Forge G. S., Mark II;" the boxes are secured in position by nib-irons and thumb-screws; the two front boxes are fitted with drawers to carry smiths' and wheelers' tools, and the two sides are for carrying coal. The forge is placed between the coal boxes, and secured when travelling by leather straps and the tailboard of the wagon; when required for use the tail-board is turned down, and the forge, which is provided with rollers, is run out on the tail-board to facilitate removal. On the top of the front boxes are secured a block for the anvil, two lantern-boxes (one for two distinguishing lanterns,† and one for two folding lanterns), two picketing ropes, one grindstone, and two empty coal sacks. To the top of the "off" coalbox, eight farriers' aprons are strapped.

The perch is formed of steel plate, bent so as to form a tapering box girder, and fitted with a perch eye; it carries an anvil. Two propsticks are fitted on the under-side.

The axle-tree is tubular steel, 2nd class "C," No. 38.

The wagon is fitted with four bale hoops, for a canvas cover. To the bale hoops, four farriers' bags are strapped.

The limber is generally similar to the carriage limber, but is fitted with a limber box, internally arranged to carry cans, boxes, and tins, for the oil, soap, dubbing, &c., allowed for this equipment.

The wheels used with this wagon and limber will be "C," No. 36.

Dimensions, &c.

Total length with pole ..	..	..	..	..	22' 9"
Maximum width ..	..	..	..	..	6' 2"
Length between axles ..	..	..	..	..	8' 1"
Wheels { track ..	..	..	..	..	5' 2"
{ diameter ..	..	..	..	..	5' 0"
Space required to turn in ..	..	..	..	..	29' 4"
Angle of lock ..	..	..	..	..	60°
Upsetting angle ..	..	..	..	..	30½°
Rectangular space occupied in boats ..	..	..	..	14' 2" x 6' 2" x 6' 9"	
Tonnage { for shipment ..	..	..	..	..	7.066 tons
{ for transport in boats ..	..	..	..	..	14.98 "

Weights (approximate).

(Packed, including personal equipment).

					ewt.	qr.	lb.
Wagon and limber ..	..	..	..	..	39	0	6
Wagon and { weight on two fore wheel ..	..	..	..	..	17	3	9
limber { " " hind " ..	..	..	..	..	21	0	25
Wagon (trail on ground) ..	..	..	..	..	23	0	12
Limber.. ..	..	..	..	..	15	3	22
Weight at end of pole ..	..	..	..	..	—	1	0
Pressure of perch on ground ..	..	..	..	..	2	2	15

† Distinguishing lanterns are carried in the ammunition columns only.

Wagon, Store, R.A., Mark II.
Limber, Wagon, Store, R.A., Mark II.*

This wagon is similar to the forge wagon, Mark III, but the body is fitted with four wooden boxes, secured by nib-irons and thumb-screws; the three front boxes are for carrying stores, and the rear box for stationery.

The limber is that described for the Mark III forge wagon but the limber-box differs in its internal fittings.

The wheels issued with this wagon and limber will be "C," No. 36.

Dimensions, &c.

Total length, with pole	.. .. .	22' 9"
Maximum width	.. .. .	6' 2"
Length between axles..	.. .. .	7' 9 1/2"
Wheels { track	.. .. .	5' 2"
{ diameter	.. .. .	5' 0"
Space required to turn in	.. .. .	29' 4"
Angle of lock	.. .. .	60°
Upsetting angle (packed)	.. .. .	29 1/2°
Rectangular space occupied in boats	14' 2" x 6' 2" x 7' 3"	
Tonnage { for shipment	.. .. .	8.127
{ transport in boats	.. .. .	16.089

Weights.

(*Packed, including personal equipment.)

		cwt.	qr.	lb.
Wagon and limber	.. .. .	35	2	2
Wagon and { weight on two fore wheels	.. .. .	15	2	2
limber { " hind "	.. .. .	20	0	0
Wagon (perch on ground)	.. .. .	21	0	22
Limber	.. .. .	14	1	8
Weight at end of pole	.. .. .	0	1	11
Pressure of perch on ground..	.. .. .	1	3	17

Wagon, Ammunition and Store, R.A., Mark II*.

(Plate VIII.)

The body of this wagon consists of a framework formed by two sides, *a*, and two summers mortised into a front and rear earbed, *b*. This framework is strengthened by plates riveted on the inside; it is housed and bolted to a front bolster, *c*, a cross bar, *d*, and a rear bolster, *e*. In front and rear of the front bolster, front and rear wheel bolsters, *f*, are bolted to the summers, and to these three the upper wheel plate, *g*, is attached. The front bolster is shod with a friction plate, and is plated at the sides.

The body is supported over the hind axle upon two side-stays of T-iron, and a cross-stay of round iron. Each side-stay rests in an axle-block of oak upon the shoulder of the axle-tree, where it is secured by axle-tree staples by a clip plate, and by the end of the cross-stay, which latter serves as a coupling plate.

The frame is boarded over to form the bottom of the wagon; and movable sides, *A*, head-board, *B*, and tail-board, *C*, are fitted to it.

A locker is formed in front of the wagon body by a sliding partition. The lid of the locker is fitted with a raised box and driving-seat, *k*, a back-board, *l*, being hinged to it, and a foot-board, *m*, to the head-board of the wagon. A small locker, *n*, is also formed between the summers underneath the rear of the wagon.

These wagons are now fitted with cranked guard-irons, and the driver's seat is made slightly higher for convenience in driving with long reins. The foot-board is increased in length and width, and fitted

* Without stationery.

with a long toe-piece, and further supported by iron stays fitted to its under-sides and to the front earbed.

The fore carriage of the wagon is formed of four futchels, *o*, housed in and bolted to a splinter bar, *p*, and a cross-bar, *q*. An upper bolster, *r*, is bolted over, and an under bolster, *s*, beneath the centre of the futchels. A wheel plate is attached to the upper bolster, to the cross-bar, and to a small wheel bolster, *t*, placed in front. The upper bolster is shod with a friction plate, and both it and the lower bolster are strengthened by plates.

The frame of the fore carriage is supported over its axle in the same manner as the body over the hind axle.

The wagon is fitted for pole draught, which consists of a pole, bar supporting pole, two swingle-trees, and two draught chains.

The body and fore carriage are connected by a main pin, which passes through bolster plates in the main bolsters, and is keyed beneath.

The foot-board is of elm, the other boarding of yellow deal, and the remainder of the woodwork of the wagon of oak.

The fore wheels are 3 feet 4 inches in diameter, the hind 5 feet. The axles are 2nd class.

The wheels first issued with the wagons were:—

fore No. 33 } with wood naves.
hind No. 32 }

Later issues of the wagons may be met with having:—

fore No. 28 } with metal naves.
hind No. 25, 27 or 39 }

Nos. 28 and 39 wheels will only be issued to replace existing wheels of other numbers as the latter become unserviceable.

The wagon is fitted to carry a spare fore wheel, a "pole, flag, distinguishing,"† entrenching tools, carbines, and swords, and a drag shoe with chain, &c. A locking plate, *u*, is attached beneath the frame to prevent the fore wheel injuring the latter in wheeling on rough ground.

The following articles belong to the wagon, namely, five bale hoops, *x*, a waterproof canvas cover with lashing rope, bar-stay, three lashing ropes, to secure the spare wheel, and drag shoe with chain, and half-round grease tin.

The drag shoe is attached to a ram's-horn hook fixed on the "near" side. The shoe, when not in use, is carried in a bracket on the side, and secured by straps. In the plate, the old manner of carrying it is shown.

The bale hooks are of ash, fitted with leather stops, and numbered from one upwards, commencing with the front hoop, a corresponding number being placed upon the wagon side at the upper staple for the bale hoop. The front hoop has also the register number of the wagon painted upon it.

The canvas cover is waterproofed, and has the register number of the wagon painted upon it.

The bar-stay is of ash, to fit from side to side, and keeps the sides from spreading out when the wagon is packed and the tail-board down.

The extreme load is 2 tons.

Weight	.. .. .	20½ cwt.
Tonnage { for shipment .. .. .	.. .. .	4.659 tons.
{ for transport in boats .. .. .	.. .. .	12.839 "
Rectangular space occupied in boats .. .. .	.. .. .	11' 4" x 6' 3"
Upsetting angle .. .. .	.. .. .	30°
Angle of lock .. .. .	.. .. .	103°
Space required to turn in .. .. .	.. .. .	23' 7"

Note.—The stores carried in this wagon are laid down in the Tables of Equipment.

† This pole is issued for ammunition columns only.

Wagon, Artillery, Mark I.*

(Plate VIII.)

The wagon consists of a light-framed body, mounted on steel springs, with a lock under fore carriage.

The fore carriage is connected to the body by a ball and socket joint, which gives an easy movement to the wagon, and enables it to travel over rough ground without straining and twisting.

The wagon is fitted for pole draught, which consists of a pole, a bar supporting pole, two swingle-trees, and two draught chains.

A driving seat (*a*) is provided, for use with pole draught. The front board is hinged to the body, and is fitted with securing chains, to admit of its being turned down to form a foot-board (*b*).

An auxiliary seat (*c*), which is placed across the wagon, is provided for convenience in carrying men when the wagon is not fully loaded. Both seats are removable, and when not in use, are carried beneath the bottom of the wagon, where they are secured by suitable fittings.

Two removable partitions are supplied with each wagon; the front one, and the front board, form a locker; the hind one is intended to keep the load at the back of the wagon when it is not full, or to prevent the load slipping under the men's feet when the auxiliary seat is used.

When the front board is utilized as a foot-board, the wagon sides are held in position by the front partition, the top corners of which are fitted with iron clips or hooks to grip the sides for this purpose.

The partitions, which are retained in position by cleats fixed to the wagon sides, can also be brought close together to form a front locker when the front board is turned down. When the rear partition is not required, it can be placed close up to the front one, or be carried in any position where most convenient.

A small trap door is let into the floor of the wagon to give access to a metal grease-box, which contains lubrication for the ball and socket joint. This box is fitted with a spring and plug, which forces the grease down a tube to the joint. The box is covered with a screwed top, and this should be occasionally removed and the box replenished with grease, especially before proceeding on a long journey.

The axle-trees are hollow steel tubes, with second class arms. The outer faces of the drag washers are recessed, and the linch-pins are made with a shoulder, which runs in the recess, to obviate the use of linch-pin ties. A slot is formed in the washer, to allow of the withdrawal of the linch-pin.

The wheels are Nos. 38 and 37. They are second class; the hind wheel is 5 feet in diameter, and the fore 3 feet 6 inches. They have $2\frac{1}{2}$ -inch tires and iron naves with 11-inch pipe boxes.

The wagon is fitted with floating raves, bale hoops, and the usual fittings for camp stores and intrenching tools.

Extra staples are fixed near the centre of the sides, to carry the front bale hoops when long rein driving is resorted to, and small hooks (*d, d*) are fixed on the rear parts of the sides for the cover to be laced to, so as to keep it clear of the wheels.

The wagon is fitted to carry a spare fore wheel on the under-side, at the rear, also a spare subdivision wheel, by means of an axle-arm which is fitted at the rear.

The sides and ends are removable, and the floating raves are jointed, so that the whole can be conveniently packed for shipment.

The capacity of the wagon is 43 cubic feet, but the load must not exceed 15 cwt.

The wagon should be frequently examined, to see that the fittings, working parts, &c., are in proper condition, and that all nuts and bolts, which occasionally become loose through jolting, are properly tightened up, especially before and during a march.

Special care in packing the load of the wagon is desirable. The contents should be closely packed; the bulkiest and lightest portion being over the front wheels, and the general weight of the load should be central between the sides.

Weight	.. .. .	14½ cwt.
Tonnage { for shipment	.. .. .	4.729 tons.
{ for transport in boats	.. .. .	14.308 "
Rectangular space occupied in boats:—12' 3½" x 6' 2½" x 7' 6", total height.		
Upsetting angle	.. .. .	20½°
Angle of lock	.. .. .	119°
Space required to turn in	.. .. .	29' 2"

Note.—The stores carried in this wagon are laid down in the Tables of Equipment.

General Instructions for Care and Preservation*

Care should be taken that all nuts and screws are properly tightened up; if removed, they should be slightly oiled before being replaced; and to prevent damage by the threads crossing, a few turns should be given by hand before using the spanner.

On no account should a hammer be used in removing the nuts or screws.

All parts should be kept clean.

When painting the carriage or limber, care should be taken not to paint these surfaces over which motion, whether lineal or circular, takes place.

Before travelling, the wheels and axle arms should be freed from grit, the latter well greased, and all nuts properly screwed up with the spanners provided for that purpose.

As the axle-tree arms and pipe boxes wear, leather washers should be used at outer end of axle-tree arm—steel or iron washers are bad for this purpose, as they increase the wear of the arm and of the end of the pipe-box.

Wheels.—Filling-in pieces often require resetting and shortening, for the spokes shrink from back to front, as well as across, and the filling-in pieces, not shrinking in the direction of their length, prevent the flanges from going home on the spokes, causing a shaky wheel. When spokes shrink across, the tire must be tightened up.

Broken or damaged spokes should be replaced at once.

In wheels of the double spoke pattern, the "on" and "off" spokes are not interchangeable, and the feet of the spokes, resting partly in sockets in the flanges, and partly on the pipe-box, great care must be exercised that the slip-spoke is kept to its full length.

The limbers must always be parked with the pole on the ground, and great care must be taken in limbering up (when the horses are not harnessed in) that the pole is not allowed to rise above its horizontal position.

Hydraulic Buffers.—The buffers must always be quite full, or damage will be done to the carriage when the howitzer is fired. Always before firing service or blank charges, and periodically at other times, the cradle must be placed in the horizontal position, and

* For detailed instructions as to method of carrying out repairs &c. see "Handbook for Military Artificers."
(5465)

the filling hole plugs removed to see if the oil shows at the filling holes; if not, more oil should be poured in, until it does show, and the plugs replaced.

Great care must be taken that no dust or gritty matter is poured in with the oil. If any leakage of oil takes place at the glands, or front plugs, they should be tightened; if this will not stop the leak, the packing must be renewed.

To Pack the Gland.—Fully depress the howitzer, unscrew the gland, and slip it along the piston rod; replace the defective packing with fresh material, which must be well saturated with Russian tallow before insertion.

To Pack the Front Plug.—Empty the buffers, unscrew the plug, take out the defective packing, insert a new lead packing, replace the plug, and refill the buffers.

To Empty the Buffers.—Depress the howitzer, and remove the front plugs, allowing the liquid to run into a clean can or other convenient vessel.

Total Contents, Buffers.— $2\frac{3}{4}$ pints.

To Insert New Running-out Springs.—Remove the nut bolt and tension bolt from the cradle, place the end of the nut bolt in the socket between the side brackets, unscrew the bolt, and take off the defective spring or springs. Insert a new spring or springs, placing each under an initial compression of 1.75 inches by means of the tension bolt, and replace the nut and springs in the cradle.

PROJECTILES.

(Plates IX, X, and XI.)

		Diameter.		Length.	Bursting Charge.		Weight filled and fuze.
		Body.	Band or Studs.		Nature.	Weight.	
		in.	in.	in.		lb. oz.	lb. oz.
Shell {	Common, Mark I. ...	4.96	5.11	15.0	{ P. Powder	2 9½	50 0
	Shrapnel, Mark I. ...	4.96	5.11	12.1	{ F. G. ,,	0 9½	50 0
	Case, shot, Mark I. ...	4.95	5.1	*13.11	Pistol powder	0 4	50 0
					..	...	50 0

* Length over handles 13.91 ins.

Common Shell.

(Plate IX.)

The shell is made of cast iron. Near the base, a groove is turned; four ridges project on the groove, and ten axial chisel marks are cut across the ridges to prevent the driving band turning on the shell.

The driving band is made of copper, and is pressed into the groove, round the shell.

The head of the shell is struck with a radius of two diameters, the point truncated, bored out, and screwed right hand, to receive the bush for fuze. The bush is made of gunmetal; it is bored and screwed to the G.S. fuze hole gauge.

Shrapnel Shell.

(Plate X.)

The body of the shell is made of forged steel, with a solid base. The shell is about 2 inches shorter than the common shell, but in general exterior form is otherwise similar.

In the base of the shell is placed a tin cup to contain the bursting charge. A steel disc is placed on the shoulder, in the bottom of the shell, above the tin cup, to support the weight of the metal balls; a hole is bored and screwed through the disc to receive the lower end of the central tube, the upper end of which is secured in the gunmetal head.

The shell is lined with brown paper, and contains 288 (16 to the lb.), and 84 (50 to the lb.) mixed metal balls, distributed as shown on the Plate; the interstices between the shot are filled with resin. The top of body is closed by a felt washer, for the head to set down on.

The head is of gunmetal, the lower end screws into the body, the inside being screwed to G.S. fuze-hole gauge; the lower portion is tapped to receive a primer. The head is strengthened by six webs, and the spaces between them are fitted with wood blocks.

Case Shot.*

(Plate XI.)

The case is made of tin, in three longitudinal pieces, the top of sheet iron, fitted with an iron handle for lifting. It is lined with four segments of iron, and an iron disc is riveted on to form the base which carries an iron stud in the centre to which is attached a wooden block, $1\frac{1}{2}$ inches thick.

A copper band is let into the wood block at a distance of '5" from the base.

The case is filled with 433 mixed metal balls (14 to the lb.), the interstices being filled with clay and sand in equal proportions.

Drill Shell.

This is of cast iron, fitted with two copper bands to prevent injury to the rifling in loading and unloading. The nose is bushed similar to the common shell, and the base is fitted with a hollowed and flanged nut of gun-metal with a groove to take a rope grummet which prevents the shell being rammed too far home.

Diameter of body	..	..	..	4.92 inches
" " bands	..	..	..	4.96 "
" " base	..	..	..	5.18 "
Length of shell	..	..	..	16.00 "

Instructions for Filling Shells.

Shells for this equipment are issued filled. Full instructions as to the class of powder which may be used, and the method of filling, are laid down in the Magazine Regulations.

Fixing Plugs and Fuzes.

All shell for field service are issued filled: when, however, it is necessary to remove plugs or metal fuzes, they will be slightly lubricated (with Field's grease at home stations, and with black grease at stations abroad), before being replaced in the shell.

* A modified design of case shot will shortly be issued.

Distinguishing Marks.

Shrapnel shell will be painted with a red tip 1 inch deep.

Steel shell will have a white band, $\frac{1}{2}$ inch wide, painted round the head, 1 inch from the top; in the case of Shrapnel, this white band will be immediately below the red tip. "F.S." will be stamped on the base of forged steel projectiles.

Filled shells will be marked in red letters, $\frac{1}{4}$ inch long (except the letter P), as follows:—

- (a) A band, $\frac{1}{2}$ -inch wide, round the head, $1\frac{1}{2}$ inches from the top. In the case of steel shell, this will come just below the white band.
- (b) The monogram of the station, except when filled by the R.A.
- (c) The date of filling.
- (d) The letter P, 1-inch long, if filled with P and F.G.

Projectiles which are to be used for practice only, will be marked with a yellow band, $\frac{1}{2}$ inch wide, round the body.

Examination of Filled Shells.

The examination of filled shells will only be carried-out by an Inspector of Warlike Stores, the general procedure being as follows:—

COMMON SHELL.

Remove the fuze hole plug, and by means of the "Hook, G.S. wads" withdraw the "Bags, Primer." Draw out the neck of the bag, by the same means, and untie the twine round it. If the powder is in a serviceable condition, tie up the neck of the bag again, and proceed as directed in the instructions for filling, having previously inserted additional powder within the bag, if necessary, to fill the shell.

If the powder is caked from the effects of damp, the shell must be returned into store.

SHRAPNEL.

Remove the fuze hole plug, and note especially whether any powder has worked up into the socket. Unscrew the primer with the "large screw-driver," and lift it out with the "pincers, shrapnel primer," turn the shell nose downwards and tap with a mallet, and if the powder charge flows out and is serviceable, refill and replace the primer and plug; if the powder cannot be extracted as above, being caked from the effects of damp, &c., the primer and plug will be replaced, and steps taken for the exchange of the shell.

FUZES.

(Plate XII. and XIII.)

Direct-Action, No. 3, Mark II.

Time and Percussion, Middle, No. 54, Mark II.

• Direct-Action.

(Plate XII.)

This fuze is intended to act on direct impact; it cannot be depended on to act on graze unless fired at angles of elevation of 10° and upwards.

It is made of gunmetal, turned all over, and screwed below the head to fit G.S. fuze-hole. The interior is bored out at the lower end for the powder charge, and closed with a screw base plug. A recess in the upper part of the fuze is charged with detonating composition, and the holes communicating with the magazine are filled with powder priming. The fuze is fitted with a steel needle, passing through, and secured in, a copper suspending disc .032 inch thick. The lower part of the fuze is filled with pistol powder. A gunmetal cap having a T-shaped slot cut out in each side to fit over the projecting pins in the head of the fuze, is secured over the top.

On striking any object, the suspending disc is driven in and the needle is forced against the detonating composition, thereby exploding the fuze.

Weight 7 $\frac{3}{4}$ oz.

Time and Percussion, Middle.

(Plate XIII.)

The body is hollow, and has a stem on its upper side. Round the base of the stem an annular groove is cut, from which a hole is bored to the side of the body, for the gas to escape through. The sides of the body are pierced with three fire holes; the top of the body is screwed to receive a hexagonal cap. The cap fits the hexagonal hole in the centre of the "key, fuze universal." Between the cap and the dome fits a brass washer with feathers fitting into slots on the stem of the body; it is to prevent the dome from turning with the nut and altering the setting of the fuze when the cap is screwed tight.

The composition ring has an annular groove round it for the composition, a projection on the upper side contains the hammer with steel needle, suspended by a .022 inch wire, and a detonator, under it for lighting the composition in the ring. The hammer is also secured by a safety pin passing under it, the hole in the ring left by its withdrawal being closed by a brass pellet with a spiral spring above it.

The composition ring is barrel-shaped outside to facilitate the setting of the fuze. The ring is kept in position by three projections on the side, which fit closely round the stem of the body. An escape hole is bored through the top of the ring at the commencement of the composition, and three radial ones are bored through the inner side at equal distances round it.

The top and first radial holes are covered with paper, the two other radial holes with asbestos. The ring is graduated from 0 to 30, and reads a quarter units, and has an arrow head between the last graduation and the commencement, to show the position of safety.

The body has an arrow head on it for setting the fuze, opposite which is a hole from the surface to the percussion arrangement, filled with powder, for communicating the flash when the composition has burnt to it.

A small hole in the side is to receive the pin in the semi-circular arm of the universal fuze key when screwing the fuze into the shell.

The fuze is stamped **T** on the ring close to the "time" safety pin, and **P** on the body close to the "percussion" pin to distinguish them. If the fuze is required to act as a percussion fuze only, the **P** pin should be withdrawn, if as a time fuze only, the **T** pin, and if as a time and percussion fuze, both pins.

To set the time arrangement of the fuze, the nut is loosened with the "key, fuze, universal," and the ring moved round till the required graduation is opposite the arrow on the body, the nut is then tightened, great care being taken to see that it is screwed down as tightly as possible.

The time of burning of the fuze at rest, when set at 30, or full length, is 16 seconds.

The action of the time arrangement is that, on discharge, the hammer sets back, shearing the suspending wire, and fires the detonator, which lights the end of the ring of composition; this burns until the channel communicating with the lower part of the fuze is reached, when the flash passes down it and fires the detonator and magazine in the percussion arrangement.

Weight.. .. 1 lb. 4 oz.

CHARGES.

(Plate XIV.)

The service cartridge consists of a core and three rings; the bag for the core is made of shalloon, in four pieces; the piece which covers the base has a shalloon disc sewn to it inside, the stitching passing round the circumference and across the centre, forming four compartments, in each of which is placed 2 drams of R.F.G.² powder.

The core is made up of a 2-ounce bundle of size 3 $\frac{3}{4}$ cordite forming the neck, round one end of which a ring of 1 $\frac{1}{2}$ ounce cordite is placed, forming the base. The cordite of both neck and base is bound in several places by silk twist. Two pieces of silk braid are sewn on the base opposite to each other for securing the rings. The rings consist of 2 $\frac{1}{16}$ ounces cordite, bound with shalloon.

Length (not to exceed)	.. ..	3.2-inches.
Diameter of rings (not to exceed)	.. ..	3.6 "
„ base about	.. ..	3.8 "

Blank Cartridge.

The cartridge is made of No. 1 class silk cloth, and sewn with two rows of silk sewing; the bottom is made circular in form, and secured to the lower end of the cartridge with silk sewing; 4 silk braids are threaded round the cartridge, each braid having a loop formed at one end for the purpose of tightening up and making a firm cartridge.

The cartridge is filled with 3 lbs. of blank L.G., R.L.G., or R.L.G.² powder, choked at the top, and secured with silk twist.

DRILL CARTRIDGE.

The cartridge consists of the core and 3 rings.

The core is of wood, covered with leather, the leather being secured to the core with copper tacks.

The rings are made of string, bound with leather; two pieces of leather lace are sewn on the opposite sides of each ring; the rings are then secured to the core by two leather laces.

Diameter (not to exceed).. .. 3.8 inches.

Length " " " " " " 3.2 "

Note.—Batteries practising either with blank cartridges or projectiles should leave their drill-shell and cartridges in camp or barracks.

The tampeon is not to be taken out of the gun park.

TUBES.

T Friction Tube, Mark I.

(Plate XV.)

The form and general dimensions of the tube are shown on the Plate, and consist of the following principal parts:— Body (*a*) head (*b*), ball (*d*), plug (*e*), friction wire (*f*).

The head is of gunmetal, the body of solid-drawn brass, the ball of soft copper, and the friction bar of doubled copper wire, the bight being formed into a loop, and the ends twisted together and roughened. A hole in the head of the tube over the friction wire is charged with about 2 grains of detonating composition, in the form of a paste, laid over the roughened part of the friction wire. A gut skin disc, (*g*) is placed over the composition, and a shellaced cork plug (*h*) inserted over the disc, the hole being filled up flush with shellac cement. The body is charged with 8 grains of pistol powder, and is closed with a shellaced cork plug (*h*) covered with shellac cement.

A brass pin (*c*) is inserted to prevent the body becoming unscrewed. The upper part of the body has a central perforation, which is enlarged in its lower part into a conical recess. The ball (*d*) is placed in this recess, and is retained therein by a screwed plug (*e*) pierced by three fire holes.

On the withdrawal of the friction bar the denoting composition is ignited, and the flash, passing down the perforation in the head and through the plug, fires the powder charge. The ball is driven upwards by the explosion and seals the tube. This, together with the mode in which the tube is held in the special vent employed with it, prevents the rush of gas through the vent.

The body is lacquered inside and outside.

The tubes are issued in square tin boxes, 19 in a box. Both the top and bottom of the box are removable, being secured by soldered bands, and the tubes are so arranged that five may be withdrawn from the top and five from the bottom.

Note.—Tubes, after firing, are to be returned to Woolwich, to be repaired and refilled; they should be immersed in mineral oil within 24 hours after firing, for which purpose $\frac{1}{2}$ gallon of oil per 100 tubes—of which 2 ounces ($\frac{1}{10}$ th pint) would be used up in the treatment—is allowed.

T Friction Tube, Drill, Mark I.

The drill tube is made of hardened steel, of the same external shape as the service tube. The head of the tube is grooved to receive a hardened-steel spring, which is attached in the groove by a screw from the under side of the head. The end of the spring is bent down to nearly meet the bottom of the groove, which is raised to form a jaw, through which the hook of the lanyard can be drawn by a pull of about 50lbs.

Total length of both tubes. . . . 1.9"

Range Table for 5-inch B.L. Howitzer, Mark I.

Based on Practice of 23rd and 30th April, 1895.

Minute 39,200 I.

Charge,	{	weight, $3\frac{1}{2}$ oz. (CORE ONLY).	40185
		gravimetric density, $\frac{328.5}{0.084}$.	7812
		nature, cordite, size $3\frac{1}{2}$.	
		Muzzle velocity, 402 f.s.	
		Nature of mounting, travelling, field.	
Projectile,	{	common or shrapnel shell.	
		weight, 50 lb.	

40185
7812

Remaining velocity.	Slope of descent.	5 minutes' elevation or deflection alters		Deflection for drift.	ELEVATION.	RANGE.	60 per cent. of rounds should fall in			Time of flight.
		Range.	Laterally or vertically.				Length.	Breadth.	Height.	
f.s.	1 in.	yards.	yards.	° /	° /	yards.	yards.	yards.	yards.	secs.
399	32	5	0.14	0 1	1 39	100	5.5	0.06	0.17	0.75
396	16	5	0.29	0 3	3 15	200	6.0	0.12	0.37	1.53
393	10	5	0.43	0 4	4 58	300	6.5	0.25	0.65	2.23
390	8	5	0.58	0 6	6 44	400	7.0	0.39	0.88	3.10
387	6	5	0.72	0 9	8 30	500	7.5	0.46	1.25	3.87
384	5	4	0.87	0 12	10 26	600	8.0	0.54	1.50	4.70
381	4	4	1.01	0 16	12 24	700	8.8	0.58	2.20	5.56
377	3	4	1.16	0 20	14 27	800	9.7	0.62	2.93	6.43
373	3	4	1.31	0 26	16 35	900	10.5	0.66	3.50	7.32
369	3	4	1.45	0 32	18 49	1000	11.4	0.69	4.50	8.25
365	2	3	1.60	0 39	21 19	1100	12.4	0.71	5.60	9.20
362	2	3	1.74	0 46	24 9	1200	13.5	0.73	6.75	10.28
360	2	3	1.89	0 56	27 24	1300	15.5	0.74	11.85	11.51
359	1	2	2.03	1 9	31 36	1400	18.1	0.74	18.10	13.19
359	1	1	2.18	1 30	38 30	1500	23.4	0.78	..	15.70

Range Table for 5-inch B.L. Howitzer, Mark I.

Based on Practice of 23rd and 30th April, 1895.

Minute 39,200 I.

Charge,	{	weight, 6 $\frac{1}{2}$ oz. (CORE and 1 RING).	{	Muzzle velocity, 556 f.s.
		gravimetric density, $\frac{195.2}{0.142}$		
Projectile,	{	nature, cordite, size, 3 $\frac{1}{2}$.	{	Nature of mounting, travelling, field.
		common or shrapnel shell.		
		weight, 50 lb.		

Remaining velocity.	Slope of descent.	5 minutes' elevation or deflection alters		Deflection for Drift.	ELEVATION.	RANGE.	50 per cent. of rounds should fall in			Time of flight.
		Range.	Laterally or vertically.				Length.	Breadth.	Height.	
f.s.	1 in	yards.	yards.	° /	° /	yards.	yards.	yards.	yards.	secs.
532	60	9	0.14	0 1	0 55	100	0.5	0.20	...	0.56
548	30	9	0.29	0 2	1 51	200	1.0	0.25	0.03	1.25
544	20	9	0.13	0 4	2 46	300	1.5	0.32	0.07	1.72
539	15	9	0.58	0 6	3 43	400	2.0	0.38	0.13	2.30
534	12	9	0.72	0 8	4 39	500	2.5	0.44	0.21	2.87
529	10	8	0.87	0 10	5 36	600	3.6	0.50	0.36	3.43
524	8	8	1.01	0 12	6 36	700	4.6	0.56	0.58	4.07
519	7	8	1.16	0 14	7 36	800	5.6	0.61	1.06	4.78
514	6	8	1.31	0 16	8 38	900	6.7	0.68	1.62	5.30
509	5	8	1.45	0 18	9 44	1000	7.8	0.76	2.18	5.94
504	5	7	1.60	0 20	10 50	1100	8.9	0.84	2.83	6.58
499	4	7	1.74	0 22	12 00	1200	10.0	0.95	3.48	7.24
495	4	7	1.89	0 24	13 10	1300	11.3	1.04	4.25	7.89
491	3	7	2.03	0 27	14 27	1400	12.6	1.27	5.02	8.56
487	3	6	2.18	0 50	15 43	1500	14.2	1.40	5.85	9.24
483	3	6	2.32	0 33	17 06	1600	16.0	1.63	6.88	9.91
479	3	6	2.47	0 26	18 29	1700	17.9	1.89	8.13	10.53
475	2	6	2.61	0 39	19 56	1800	20.2	2.18	9.38	11.31
471	2	5	2.76	0 43	21 23	1900	22.9	2.50	11.07	12.06
467	2	5	2.91	0 46	22 54	2000	25.8	2.84	12.77	12.85
464	2	5	3.05	0 51	24 30	2100	29.0	3.21	15.10	13.71
462	2	4	3.21	0 56	26 12	2200	32.8	3.63	...	14.67
461	1	4	3.34	1 0	28 10	2300	38.1	4.06	...	15.76
460	1	3	3.49	1 6	30 29	2400	45.4	4.56	...	17.12
458	1	2	3.63	1 20	33 38	2500	46.5	4.60	...	18.89
458	1	1	3.78	1 49	38 44	2600	47.6	4.61	...	21.32

Range Table for 5-inch B.L. Howitzer, Mark I.

Based on Practice of 22nd April and 9th May, 1895.

Minute 39,200 I.

Charge,	{	weight, $8\frac{1}{16}$ oz. (CORE and 2 RINGS).	Muzzle velocity, 670 f.s.
		gravimetric density, $\frac{138.8}{0.199}$	
		nature, cordite, size, 3 $\frac{1}{2}$.	
Projectile,	{	common or shrapnel shell.	Nature of mounting, travelling, field.
		weight, 50 lb.	

Remaining velocity.	Slope of descent.	5 minutes' elevation or deflection alters		Deflection for drift.	ELEVATION.	RANGE.	50 per cent. of rounds should fall in			Time of flight.
		Range.	Laterally or vertically.				Length.	Breadth.	Height.	
f.s.	1 in	yards.	yards.	" /	" /	yards.	yards.	yards.	yards.	secs.
665	84	12	0.14	0 1	0 40	100	1.8	0.09	0.02	0.47
660	42	12	0.29	0 2	1 20	200	2.7	0.16	0.06	0.99
656	23	12	0.43	0 3	1 57	300	3.4	0.23	0.12	1.46
652	22	12	0.58	0 3	2 36	400	4.0	0.30	0.18	1.95
648	17	12	0.72	0 4	3 14	500	4.6	0.37	0.27	2.42
644	14	12	0.87	0 4	3 52	600	5.3	0.44	0.38	2.91
640	12	12	1.01	0 5	4 31	700	5.8	0.51	0.48	3.40
636	11	12	1.16	0 6	5 10	800	6.4	0.58	0.58	3.87
632	9	12	1.31	0 7	5 49	900	7.1	0.63	0.80	4.35
628	8	12	1.45	0 9	6 31	1000	7.8	0.78	1.06	4.85
624	7	12	1.60	0 10	7 12	1100	8.6	0.84	1.37	5.34
620	7	12	1.74	0 12	7 55	1200	9.4	1.00	1.62	5.84
616	6	12	1.89	0 14	8 38	1300	10.0	1.10	1.91	6.34
612	5	11	2.03	0 16	9 22	1400	10.6	1.20	2.20	6.84
608	5	11	2.18	0 17	10 8	1500	11.3	1.30	2.52	7.35
605	4	11	2.32	0 19	10 55	1600	12.0	1.40	2.84	7.90
601	4	10	2.47	0 20	11 42	1700	12.6	1.50	3.20	8.44
597	4	10	2.61	0 21	12 33	1800	13.2	1.60	3.56	9.01
593	3	10	2.76	0 23	13 24	1900	13.8	1.69	3.96	9.59
589	3	9	2.91	0 25	14 18	2000	14.4	1.78	4.36	10.18
585	3	9	3.05	0 26	15 14	2100	14.8	1.87	4.81	10.82
581	3	9	3.21	0 28	16 14	2200	15.2	1.96	5.32	11.44
577	3	8	3.34	0 30	17 16	2300	15.6	2.04	5.90	12.06
573	2	8	3.49	0 33	18 20	2400	16.0	2.12	6.48	12.71
569	2	8	3.63	0 35	19 26	2500	16.4	2.20	7.17	13.37
563	2	7	3.78	0 37	20 34	2600	16.8	2.28	7.86	14.07
559	2	7	3.92	0 39	21 44	2700	17.2	2.35	8.72	14.78
549	2	7	4.07	0 41	23 00	2800	17.6	2.42	9.58	15.57
541	2	6	4.21	0 44	24 21	2900	18.0	2.50	10.72	16.40
533	2	6	4.36	0 46	25 43	3000	18.4	2.58	11.87	17.29
525	1	5	4.51	0 49	27 13	3100	18.8	2.65	13.38	18.25
517	1	5	4.65	0 52	28 53	3200	19.2	2.72	14.90	19.31
509	1	4	4.80	0 55	30 55	3300	19.7	2.79	16.83	20.50
514	1	3	4.94	0 58	33 18	3400	20.2	2.87	...	21.92
519	1	2	5.09	1 4	36 11	3500	22.0	2.96	...	23.50
524	1	2	5.23	1 30	39 32	3600	23.8	3.05	...	25.33

Range Table for 5-inch B.L. Howitzer, Mark I.

Based on Practice of 22nd April and 10th May, 1895.

Minute 39,200 I.

Charge	weight, $11\frac{1}{8}$ oz. (CORE and 3 RINGS).	Muzzle velocity, 782 f.s.
	gravimetric density, $\frac{107.7}{0.257}$	Nature of mounting, travelling, field.
Projectile,	nature, cordite, size 3 $\frac{1}{2}$.	
	common or shrapnel shell.	
	weight, 50 lb.	

Remaining velocity.	Slope of descent.	5 minutes' elevation or deflection alters.		Deflection for drift.	ELEVATION.	RANGE.	FUZESCALE for middle T. and V. muzzle, Marks I. or II.	50 per cent. of rounds should fall in			Time of flight.
		Range.	Laterally or vertically.					Length.	Breadth.	Height.	
f.s.	1 in	yards.	yards.	° /	° /	yards.		yards.	yards.	yards.	secs.
776	122	18	0.14	0 ...	0 27	100	1 3	1.9	0.04	...	0.41
770	60	18	0.29	0 1	0 55	200	1 3	2.8	0.08	0.04	0.81
764	41	18	0.43	0 1	1 22	300	2 3	3.7	0.11	0.09	1.24
758	31	18	0.58	0 2	1 50	400	2 3	4.5	0.14	0.14	1.68
752	24	18	0.72	0 2	2 17	500	3 3	5.3	0.19	0.19	2.08
746	20	18	0.87	0 3	2 45	600	4 3	6.2	0.24	0.31	2.50
740	17	17	1.01	0 4	3 14	700	4 3	6.9	0.30	0.41	2.93
735	15	17	1.16	0 5	3 42	800	5 3	7.6	0.33	0.51	3.35
730	13	16	1.31	0 6	4 10	900	6 3	8.5	0.42	0.65	3.76
725	11	16	1.45	0 7	4 41	1000	7 3	9.4	0.48	0.86	4.17
720	10	15	1.60	0 8	5 11	1100	7 3	10.2	0.58	1.08	4.59
715	9	15	1.74	0 10	5 44	1200	8 3	11.0	0.68	1.28	5.04
710	8	15	1.89	0 11	6 15	1300	9 3	11.9	0.82	1.51	5.46
705	7	15	2.03	0 12	6 48	1400	10 3	12.8	0.96	1.74	5.90
700	7	15	2.18	0 13	7 22	1500	11 3	13.6	1.10	2.01	6.33
695	6	16	2.32	0 14	7 55	1600	12 3	14.4	1.24	2.28	6.77
690	6	14	2.47	0 15	8 29	1700	13	15.3	1.39	2.61	7.22
685	5	14	2.61	0 16	9 04	1800	13 1	16.2	1.54	2.94	7.67
680	5	14	2.76	0 17	9 38	1900	14 1	17.1	1.69	3.33	8.11
675	5	14	2.91	0 18	10 12	2000	15 1	18.0	1.84	3.73	8.59
671	4	14	3.05	0 19	10 46	2100	16 1	18.8	2.00	4.18	9.07
667	4	13	3.21	0 20	11 23	2200	17 1	19.6	2.14	4.64	9.56
662	4	13	3.34	0 20	12 00	2300	18 1	20.5	2.33	5.16	10.06
657	4	13	3.49	0 21	12 38	2400	19 1	21.4	2.50	5.66	10.57
652	4	13	3.63	0 22	13 15	2500	20 1	22.4	2.68	6.27	11.08
648	3	12	3.78	0 23	13 54	2600	21 1	23.4	2.86	6.89	11.62
644	3	12	3.92	0 24	14 34	2700	22 1	24.4	3.01	7.63	12.18
639	3	12	4.07	0 25	15 17	2800	23 1	25.4	3.22	8.34	12.68
634	3	11	4.21	0 26	16 01	29 0	24 1	26.5	3.43	9.32	13.23
629	3	11	4.36	0 27	16 46	3000	25 1	27.6	3.64	10.26	13.75
625	3	10	4.51	0 28	17 34	3100	26 1	28.6	3.85	11.23	14.33
622	2	10	4.65	0 29	18 22	3200	27 1	29.6	4.06	12.20	14.88
618	2	10	4.80	0 30	19 13	3300	28 1	30.7	4.28	13.36	15.45
615	2	10	4.94	0 32	20 04	3400	29 1	31.8	4.50	14.52	16.02
611	2	10	5.09	0 34	20 51	3500	...	32.9	4.71	15.66	16.61
608	2	10	5.23	0 36	21 46	3600	...	34.0	4.93	17.92	17.20
604	2	9	5.34	0 38	22 37	3700	...	35.2	5.22	...	17.84
601	2	9	5.52	0 40	23 31	3800	...	36.4	5.43	...	18.49
598	2	9	5.67	0 43	24 28	3900	...	37.5	5.72	...	19.16
595	2	8	5.81	0 47	25 25	4000	...	38.6	5.98	...	19.88
592	1	7	5.96	0 51	26 27	4100	...	39.7	6.24	...	20.63
590	1	7	6.11	0 55	27 35	4200	...	40.8	6.50	...	21.47
588	1	6	6.25	0 59	28 48	4300	...	42.1	6.77	...	22.34
586	1	5	6.40	1 3	30 06	4400	...	43.4	7.04	...	23.22
589	1	4	6.54	1 10	31 28	4500	...	44.5	7.37	...	24.18
592	1	3	6.69	1 19	33 30	4600	...	45.6	7.60	...	25.18
600	9	3	6.83	1 27	35 52	4700	...	46.7	7.88	...	27.29
607	8	2	6.98	1 34	38 46	4800	...	47.8	8.16	...	29.07
615	7	1	7.13	1 46	42 24	4900	...	49.1	8.98	...	31.68

SECTION DRILL.

The following paragraphs give the duties of the detachments at the section commander's orders.

Battery drill and the supply of ammunition will be carried out on the principles laid down in Field Artillery Drill.

Single detachments should be accustomed to drill as if forming part of a section, and the instructor should always use the orders given for the section commander.

On dismounted parades Nos. 6, 7, 8, and 9 will attend to the limber, Nos. 6 and 7 pushing in rear. 8 and 9 at the pole.

ARRANGEMENT.

Formation and movements of the detachment.

TO TELL OFF.

Position of "Detachment Rear."

" " "The order of March."

To form the order of march from detachment rear.

" detachment rear from the order of March.

" " "when unlimbered.

To take post from detachment rear when unlimbered.

To move the howitzer with drag-ropes.

" " without drag-ropes.

GENERAL DUTIES.

Wagon supply.

Casualties.

Details of duties.

Signals.

PREPARATION FOR ACTION.

ACTION.

Action.

To fire.

Missfire.

To load.

Case.

To stand fast.

To cease firing.

To limber up.

TO PICK UP THE LINE OF FIRE.

One aiming post.

Two aiming posts.

Auxiliary marks.

DESCRIPTION AND USE OF CROSS BAR SIGHTS.

MOUNTING AND DISMOUNTING.

To dismount the howitzer and carriage.

To mount the howitzer and carriage.

DISABLED ORDNANCE.

To replace a damaged wheel.

To remove the howitzer and carriage by a limber.

To remove the howitzer and carriage by a wagon.

FORMATION AND MOVEMENTS OF THE DETACHMENTS.

The detachment consists of 9 numbers who fall in two deep one pace between ranks, No. 1 on the right of the front rank.

TO TELL OFF.

Section Commander.

No. 1.

—Section, Tell off.

At the order from the section commander.

No. 1, numbers himself 1; the right hand man of the rear rank numbers 2; the right hand man of the front rank numbers 3; the second man from the right of the rear rank 4; his front rank man 5; and so on.

POSITION OF DETACHMENT REAR.

Formed as above three yards in rear of the howitzer wheels, No. 1 covering the off wheel.

POSITION OF THE ORDER OF MARCH.

No. 1 in line with the point of the pole, and two yards on the left of it.

Nos. 2 and 3 in line with the axle-tree of the carriage.

Nos. 4 and 5 in line with the centre of the trail.

Nos. 6 and 7 in line with the axle-tree of the limber.

Nos. 8 and 9 in line with the foot-board.

All covering to the front, and one yard from the wheels.

TO FORM THE ORDER OF MARCH FROM DETACHMENT REAR.

<i>Section Commander.</i>	<i>No. 1.</i>
—Section, Form the Order of March.	No.—Left turn, double March.

At the order from the No. 1.

The ranks open out round the muzzle, each number halts when in his place.

TO FORM DETACHMENT REAR FROM THE ORDER OF MARCH.

<i>Section Commander.</i>	<i>No.</i>
—Section detachment rear.	No. —Right about turn, double March.

At the order from the section commander.

No. 1 doubles to his place and gives the order.

At the order from the No. 1.

The numbers double into their places on the left of No. 1, each halting as he reaches his place.

TO FORM DETACHMENT REAR WHEN UNLIMBERED.

<i>Section Commander.</i>	<i>No. 1.</i>
—Section detachment rear.	No.—Double March.

At the order from the section commander.

No. 1 doubles to his place 3 yards in rear of the right wheel and gives the order.

At the order from the No. 1.

The numbers double into their places on the left of No. 1, each halting as he reaches his place.

TO TAKE POST FROM DETACHMENT REAR WHEN UNLIMBERED:

<u>Section Commander.</u>	<u>No. 1.</u>
—Section take post.	No. —Double March.

At the order from the No. 1.

All the numbers double to their places.

TO MOVE THE HOWITZER WITH DRAG ROPES.

<u>Section Commander.</u>	<u>No. 1.</u>
—Section with drag-ropes prepare to advance.	

At the order from the section commander.

Nos. 2 and 3 hook the drag-ropes to the washers, the two highest numbers go to the pole, and the remainder man the ropes.

TO MOVE THE HOWITZER WITHOUT DRAG ROPES.

<u>Section Commander.</u>	<u>No. 1.</u>
—Section without drag ropes prepare to advance.	

At the order from the section commander.

Nos. 2 and 3 push between the muzzle and wheels, Nos. 4 and 5 man the howitzer wheels, the two highest numbers go to the pole, and the remainder assist.

GENERAL DUTIES.

It is considered that in war the more important duties of *Command* will require so much attention that it is not advisable to hamper the No. 1 with those of "layer" in addition. His duties at the handspike give No. 1 control over the laying, as far as seeing that the howitzer is on the right target: while they do not prevent his exercising that general control over his detachment which is his especial function.

Except where it is otherwise ordered, the numbers work on their own side of the howitzer, even numbers on the right, odd numbers on the left.

No. 1 commands, attends to the handspike, sees that the time fuzes have been set correctly, rams home, lifts at the handspike, in running up or back, and traverses.

No. 2 attends to the brake and vent, fires, mans the wheel, and elevates or depresses if required.

No. 3 attends to the brake and breech, sets time fuzes, shows them to No. 1, takes out safety pins or uncaps the fuzes, loads and rams the wheel.

No. 4 lays and attends to sights and clinometer.

No. 5 fuze shell, supplies No. 6 with ammunition, loosening the nuts of time fuze.

No. 6 supplies 3 with ammunition and assists No. 5.

A full charge and common shell with D.A. fuze will always be used unless otherwise ordered.

WAGON SUPPLY.

One wagon for each section is brought up as detailed in Field Artillery Drill.

As soon as the wagon halts, the Nos. 5 of the two howitzers of the section, go to the wagon body, and issue ammunition to their respective howitzers as above detailed.

Nos. 6, 7, 8, and 9 first unhook the wheel horses, and then perform the duties detailed above for No. 6, to the two howitzers of the section, the even numbers to the right howitzer, the odd numbers to the left.

At drill without wagons, Nos. 7, 8, and 9 stand five yards in rear of the limber.

CASUALTIES.

The captain is responsible for the replacement of casualties as directed in Field Artillery Drill.

Section commanders order such changes of duties in their detachments as they consider necessary.

If the full detachment cannot be maintained, the duties are divided as follows:—

With five numbers.

No. 5 performs the duties of Nos. 5 and 6.

With four numbers.

No. 2 performs the duties of Nos. 5 and 6.

„ 4 „ „ „ „ „ 2 and 4.

DETAILS OF DUTIES.

No. 1 is responsible for the entire service of his howitzer. He only gives the words of command shown for him, he does not repeat the section commander's orders. His executive orders should be no louder than is necessary for his subdivision to hear.

While in action No. 1 will pay particular attention to the following points:—

(1) That the howitzer is in the general alignment of the battery.

(2) That the breech is properly closed.

(3) That the vent is examined as ordered.

Should it be necessary for No. 1 to leave the handspike, No. 2 will immediately take his place there, and ram home and traverse in addition to his own duties.

Should a case arise in which it is desirable that No. 1 should lay, he will perform the duties of No. 4, with the addition of "commands and sees that the time fuze have been set correctly," No. 4 performing No. 1's duties with the above exception.

No. 1 will traverse according to No. 4's signals.

No. 2 will assist to elevate or depress if required by No. 4 when laying back.

No. 3 opens and closes the breech as follows:—

To Open the Breech.—He takes hold of the cam lever with his right hand, releasing the lever catch with his right thumb, raises it to its full extent, draws it to him as far as it will go, using both hands, partly folds it down with the left hand until the breech-screw is started,

then raises it to its full extent, and at the same time throws the breech open by the loop with his right hand.

To Close the Breech.—With his left hand he releases the catch on the right of the breech, takes hold of the cam lever with his right hand, swings the breech-screw and carrier ring round until the carrier ring touches the breech; he then grasps the lever with his left hand, keeping it raised, and with the palm of his right he pushes the breech-screw home, forcing the lever from him as far as it will go, then folds it down, seeing it is secured by its catch.

No. 3 receives a round of ammunition from No. 6; he places the cartridge under his left arm until he has loaded the shell.

No. 4 will bring the howitzer into a convenient position for loading (marking it if necessary), and will clamp the sliding leaves of both fore and tangent sights at the required graduations, and the tangent sight at the deflection ordered (if any) and required elevation.

He will complete the laying as soon as the howitzer is loaded, either by laying directly on the target, on an aiming post placed in the line of fire, or auxiliary mark (as described in "To pick up the line of fire"). Elevation as a general rule will be given by clinometer. In giving elevation he must always depress last.

Note.—On no account should a fuze without a safety pin be placed in any ammunition box.

SIGNALS.

Nature.	By whom given.	Meaning.
Remove both sights (and clinometer if used)	Layer	My howitzer is layed.
Motions with either hand in the required direction, arm well in view	Layer	Trail right or left.
Drops his hand	Layer	Halt (traversing).
Points to vent with his right hand	No. 1	Make ready.
Holds up his hand	No. 1	Halt running up.

PREPARATION FOR ACTION.

Section Commander.	No. 1.
Section, Prepare for Action	(—Charge—) Common Load.
(—Charge—)	No. —

At the order from the section commander—

No. 1 sees that the bore is clear, the hydraulic buffers filled, superintends the other numbers, and reports to the Section Commander.

No. 2 fills the tube pocket, places a tube in the vent, and examines the brake.

No. 3 removes the breech cover and straps it to the top transom of the carriage, examines the breech fittings, loads with common and D.A. fuze (unless otherwise ordered), ramming home himself, sees that the fuze key is in the pocket on the tensile stay, and examines the brake.

No. 4 examines the sights and elevating gear.

If both sets of sights are in the howitzer, he replaces the left set in the limber. The right sights will always be used unless otherwise ordered.

No. 5 sees that the fuze key is in the pocket, examines the limber box and fuzes a common shell with D.A. fuze and hands it to 3.

The wagon numbers see that the fuze keys are in their pockets and examine the wagon boxes.

On the completion of the above, the detachment resume their places without further orders.

The numbers detailed to "Examine" the various ammunition boxes see that they are properly filled, also that the lids open easily and the locks are in good order. Any deficiencies in the limber boxes are filled up from the wagon body under the direction of the No. 1.

The lanyards of all fuze keys should be attached to the leather loop inside their pockets.

If the order "Without loading—prepare for action" or "With case—prepare for action" is given, the duties are carried out with the necessary alterations.

ACTION.

<i>Section Commander.</i>	<i>No. 1.</i>
— Section, Action Front.	No. ——— Action Front.

At the Order from the No. 1—

No. 3 unkeys and with 2 lifts the trail; when the trail is clear of the hook, No. 3 gives "Limber drive on."

Nos. 2 and 3 carry the trail round half a circle to the left (No. 2 shifting round the trail eye to avoid walking backwards) and lower it to the ground.

Nos. 4 and 5 man the wheels.

The limber moves forward one yard and reverses to the right; when sufficiently to the rear it reverses again to the right and halts—covering the howitzer with the leaders ten yards in rear of the trail eye; or at wagon supply, proceeds as directed in Field Artillery Drill.

As soon as the Trail has been Lowered to the Ground—

No. 1 ships the handspike and directs the howitzer on to the target, pointing out the target, if necessary, to No. 4.

No. 2 puts on the brake, takes the lanyard out of his tube pocket and holds it, hook in his left hand, extractor in his right, removes the tangent sight when the howitzer is layed, and hands it to No. 4.

No. 3 puts on the brake.

No. 4 will clamp the sliding leaves of fore and tangent sights at the same graduation, lays the howitzer; as soon as the howitzer is layed he removes the foresight and clinometer.

No. 5 assisted by 6 prepares to issue ammunition.

When it is necessary to mark the position of the wheels, this duty is performed by Nos. 2 and 3.

The Positions of the Various Numbers are as follows:—

No. 1 one yard in rear of the trail eye and on the left of the handspike.

Nos. 2 and 3 close to and facing the breech.

No. 4 on the right of the trail eye.

No. 5 in rear of the off limber box.

No. 6 " " near " "

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Action right, left or rear, is the same, except that at—

Action Right.—The trail is carried round a quarter of a circle only, and the limber after advancing one yard takes ground to the left and reverses to the left.

Action Left.—The trail is carried round a quarter of a circle to the right, No. 3 in this case shifting round the trail eye, and the limber after advancing one yard takes ground to the right, and reverses to the right.

Action Rear.—The trail is not carried round, and the limber after advancing one yard inclines to the left and reverses to the right.

TO FIRE.

No howitzer is ever to be fired without an *order* from the No. 1, and the No. 1 must never give this order until he has received the order from the section commander, and seen that the howitzer is in proper condition.

Section Commander.
Fire No.—Gun.

No. 1.
Points to the Vent.
(Signal for Ready)
No.—Fire.

At the order from the section commander—

No. 1 steps clear to the left and points to the vent with his right hand.

At the signal from the No. 1—

No. 2 hooks the lanyard to the tube, passing the lanyard through the hole in the bracket of the carriage should the elevation of the howitzer render it necessary, steps outside the wheel, and stands facing to the front, holding the lanyard tight with his right hand, the forearm across the body and the elbow so bent that the hand is level with the vent.

Nos. 3 and 4 step clear of recoil.

As soon as he sees No. 2 ready and the other numbers clear, No. 1 gives "No. — Fire."

At the order from the No. 1—

No. 2 slews his body to the right and thus fires the howitzer; he then places the lanyard round his neck.

Directly the howitzer stops in its recoil it is run up without any order, to its previous position.

No. 1 lifts at the handspike and gives the ordinary signal for "halt" when far enough.

Nos. 2 and 3 man the wheels.

As soon as the howitzer is run up—

No. 1 stands ready to traverse as directed by No. 4.

No. 2 takes out the tube and puts in a new one, riming out the vent if necessary.

No. 3 opens the breech.

No. 4 replaces his sights, brings the howitzer into a convenient position for loading, and lays for direction.

In Addition when using drill ammunition without further order—

No. 3 removes the drill cartridge and drill shell as soon as he has opened the breech and hands them to No. 6.

No. 6 doubles up, receives the drill cartridge and drill shell from No. 3, and returns them to the limber.

MISSFIRE.

If there is a missfire, Nos. 2 and 3 go round to the front of the axle-tree, keeping as clear of the muzzle as possible, No. 3 holds up the lever while No. 2 takes out the tube and puts in a fresh one, both taking care not to disturb the howitzer. No. 2 hooks the lanyard to the tube and they return to their places, No. 2 resuming the position of "ready."

TO LOAD.

<i>Section Commander.</i>	<i>No. 1.</i>
— Section *Common.	No. — Common — Charge —
— † Charge — Fuze — Load.	Fuze — Load.

At the order from the No. 1—

No. 2 takes the lanyard from round his neck, and holds it with the hook in his left hand, extractor in his right.

No. 3 sets the time fuze, shews it to No. 1, takes out safety pin, or if a direct-action fuze, uncaps it, and places the shell in the bore.

As soon as he sees that No. 3 is ready to load—

No. 1 takes the handspike in the centre with his left hand back up, takes a pace to the front with his left foot, and, placing the unshod end against the shell, rams it gently home; then, keeping the handspike against the shell, he applies his whole force to ensure its being true home. He then steps back and replaces the handspike in the socket.

As soon as the shell has been rammed home—

No. 3 places the cartridge in the chamber and closes the breech.

No. 4 adjusts his sights and clinometer, and stands ready to complete the laying, which he does as soon as the howitzer is loaded; he then removes both sights, or the foresight and clinometer if the latter is used.

No. 5 issues the ammunition ordered to No. 6.

No. 6 receives the ammunition from No. 5, placing the cartridge under his left arm, carrying the shell by the carrying strap, hands them to No. 3, and returns to the limber.

When layed, Nos. 2 and 3 mark the position of the wheels, if necessary.

<i>Section Commander.</i>	<i>CASE.</i>	<i>No. 1.</i>
Case.		

* Shrapnel or case. If common, nature of fuze. If shrapnel, length of fuze.

† When specifying the charge, the order is "Full charge" or "charge core and — rings."

In firing case shot, where rapidity is of the utmost importance, time will not permit of the sights being removed and replaced each round. The howitzer should be fired without the sights in the piece, laying roughly over the top of the cradle, placing two fingers over the rear rib.

TO STAND FAST.

Section Commander.		No. 1.
Stand Fast.		

At the order from the section commander—

All stand fast whatever they are doing, except that No. 2 unhooks the lanyard if it is hooked to the tube.

At the order "Go on" the work is continued.

TO CEASE FIRING.

Section Commander.		No. 1.
—Section, Cease Firing.		No. — (Charge)—Common —D.A. Fuze—Load.

At the order from the section commander.

The howitzer is loaded with common; and each number, as soon as he has performed his share of the loading (as detailed under "To load"), proceeds as follows:—

No. 1 straps the handspike on the trail.

No. 2 takes off the brake, and puts the lanyard in the tube pocket.

No. 3 takes off the brake.

No. 4 lowers the tangent sight and clamps it, replaces the clinometer.

Nos. 5 and 6 close the limber, first replacing ammunition (if required).

If the order "without loading—cease firing" or "with case—cease firing" is given, the duties are carried out with the necessary alterations.

Note.—If for any reason it is impossible to fire the howitzer when loaded with shrapnel at "Cease firing" the Battery Commander may order the cartridge to be withdrawn and the shell left in the bore. Case may in such circumstances be unloaded.

TO LIMBER UP.

Section Commander.		No. 1.
—Section, Front Limber up.		No. —— Halt, Limber up.

At the order from the section commander—

The trail is lifted by Nos. 2 and 3, and carried round a half-circle to the right, and lowered gently to the ground. Nos. 4 and 5 man the wheels. As soon as the trail is round, Nos. 2 and 3 get under cover between breech and wheels, No. 1 in front of No. 2, Nos. 4 and 5 between muzzle and wheels, Nos. 6 and 7, if present, in front of 4 and 5, the whole with their backs to the axle-tree. The limber comes up on the right of the howitzer, when it is square No. 1 gives "No. —— Halt, Limber up."

At the order from the No. 1—

Nos. 2 and 3 lift the trail and place it on the hook; Nos. 4 and 5 man the wheels; No. 3 keys up—and the whole form the order of march.

"*Right Limber up.*"—The same as "Front Limber up" except that the trail is only carried round a quarter of a circle.

"*Left Limber up.*"—The trail is carried round a quarter of a circle to the left, and the numbers get under cover as before.

"*Rear Limber up.*"—The numbers get under cover as before, but the limber reverses to the left as soon as it arrives at the trail, which is not thrown round.

TO PICK UP THE LINE OF FIRE.

ONE AIMING POST.

<i>Section Commander.</i> —	|	<i>No. 1.</i> —
—Section, One Aiming Post.		

At the order from the section commander—

No. 1, standing at the end of the handspike, directs No. 4 by signal to plant his aiming post in line with the target.

Nos. 2 and 3 mark on the ground the position of the wheels.

No. 4 doubles out about 50 yards to the front with one aiming post which he plants as directed by No. 1, and then doubles back and gets out his clinometer.

At "Go on" the firing is continued, the howitzer being layed for direction on the aiming post.

When the target cannot be seen by No. 1, the Section Commander will direct whether he should mount.

TWO AIMING POSTS.

<i>Section Commander.</i> —	|	<i>No. 1.</i> —
—Section, Two Aiming Posts.		

At this order from the section commander, which is given when the Battery is halted, previous to occupying a Position by the Deliberate Method—

Nos. 4 get out their clinometers and aiming posts.

As soon then as the signal is given (see F.A. Drill), the Section Commanders and layers fall out in the usual way, each No. 4 carrying his two aiming posts and clinometer.

The battery commander, after pointing out the target, shews the position of the front post of the directing howitzer, the layers then keeping out of sight of the enemy as much as possible, extend along the alignment and plant their front posts at the interval ordered. Each layer, as soon as he has planted his front post, doubles a short distance to the rear, and plants his second post in line with the target and the front one. He then takes up a position for his howitzer out of sight of the target and in line with his two posts, looking to the directing flank for his dressing.

The section commanders see that the layers are properly placed and then double back to the battery. On signal from the battery commander, the battery is brought up by the senior section commander, and the Nos. 1 bring their howitzers into action on their layers in line with the two posts, and Nos. 2 and 3 mark on the ground the position of the wheels.

After the first round the howitzer is layed for direction on the rear aiming post.

Aiming posts are issued in pairs of the same colour, the right

howitzers of sections having red, the left blue. They should be planted with their coloured sides towards the howitzer, except when, owing to light, &c., the section commander orders the white sides.

If necessary, and the target can be seen over the howitzer from raised ground in rear of the howitzer, No. 4 will plant his aiming post in line with the target, and an aiming post (if required) held up against the foresight by No. 2 (or 3 according to which side sights are used).

In reverse laying No. 4 will arrange the sliding leaves to suit.

As a general rule when the line has been obtained, No. 4 will lay for direction on the aiming post, taking care to have the sliding leaves of both fore and tangent sights at the same graduation (generally the third), giving the deflection ordered on the deflection scale. No. 1 traversing as directed; if laying reverse, No. 2 may assist by raising the tangent sight to enable 4 to lay on the aiming post; No. 2 may also assist by giving elevation if required. No. 4 would then place on the clinometer the elevation ordered and lay the howitzer, taking care that the last motion is one of depression.

AUXILIARY MARKS.

Advantage may be taken of the varied scope of crossbar sights to obtain an auxiliary mark for use in laying the howitzer. Some conspicuous object (such as a steeple) may be chosen, and after the howitzer is laid for direction, by shifting the sliding leaves and raising or lowering the tangent sight, a line through the sights to the object is obtained. The graduations that the sliding leaves are at, and the elevation on the tangent sight, must be carefully noted. The howitzer then being run up to the same place each time, can be laid as before, every round.

DESCRIPTION AND USE OF CROSSBAR SIGHTS.

The howitzer is sighted on both sides with crossbar sights, which consist of a tangent and fore sight.

The tangent sights drop into sockets which are set vertically, the vertical steel bars are graduated to 10° and adjustment is effected by a removable clamp. The head is of bronze, through which slides a steel horizontal crossbar, which can be fixed in any position by a clamping screw. The crossbars are graduated on the inside, *i.e.* the side nearest the howitzer, with a deflection scale giving 1° right and 3° left deflection, and on the outside with a similar scale graduated from 0° to 6° , on which slides a reversible leaf, having a notch for forward laying, and a point and crosswires for reverse laying. The bars are reversible, being graduated on one edge for the right side and on the opposite edge for the left side of the piece, and are stamped accordingly.

The fore sights consist of steel stems with horizontal crossbars forged solid. The bars are fitted with a sliding reversible leaf, having a point for forward laying, and a notch and telescopic hole for reverse laying, and are graduated from 0° to 6° to correspond with the crossbars of the tangent sights.

To use the crossbar sight.

As a rule these sights will be used for laying for direction only. Elevation being given by means of the clinometer.

For Forward Laying.

See that the notch on the sliding leaf of the tangent sight and the point of the sliding leaf of the fore sight are uppermost, and set both sliding leaves at the third graduation, put on the deflection ordered by sliding the crossbar of the tangent sight to the right for right deflection, to the left for left deflection, and lay the howitzer on the target or aiming post by moving the trail as required.

For Reverse Laying.

See that the point on the sliding leaf of the tangent sight, and the notch on the sliding leaf of the fore sight, are uppermost; set both sliding leaves at the third graduation, and proceed as described above.

To pick up an auxiliary mark.

This mark will usually be in rear of the howitzer, and should be some object that can be clearly seen and is easily distinguishable. No. 4 having set his sights for reverse laying, places himself in front of the fore sight, and selects the object which is to serve as an auxiliary mark; he then orders No. 2 to set the sliding leaf of the tangent sight at some whole graduation towards one end of the bar, say 1° or 5° , whichever is most convenient; he unclamps the sliding leaf of the fore sight, and, looking over the notch, slides it along the crossbar until it is in line with the point of the tangent sight and the object chosen as an auxiliary mark; if necessary he orders No. 2 to raise the tangent sight in its socket, till the point of the sliding leaf is level with his own eye and the object; he then notes the readings of the two sliding leaves on the crossbars and the height to which the tangent sight has been raised.

In all cases of reverse laying, when the auxiliary mark or aiming post is very near, the telescopic eyehole and crosswires should be used for accurate laying.

Should the mark be in front, the same method is followed with forward laying.

Points to be attended to in using the clinometer.

The base of the clinometer, and the plane surface on which it is to rest, should be clean and free from grit, dirt, or rust.

The clinometer should be set by turning the drum to the left, past the elevation ordered, and finishing by a turn or two to the right to the exact elevation ordered.

The clinometer should be placed on the same part of the plane surface, and the layer should stand in the same place when laying for each round.

MOUNTING AND DISMOUNTING.

This should only be practised at the annual course of military training, and then only sufficiently for instruction; every care must be taken that the equipment is not injured.

Four spare numbers beside the detachment are required.

To DISMOUNT THE HOWITZER AND CARRIAGE.

<i>Section Commander.</i>	<i>No. 1.</i>
Dismount No. — Gun and Carriage.	Prepare to Dismount the Gun. Dismount the Gun. Dismount the Carriage. Lift—Lower.

At the order "Prepare to dismount the gun"—

No. 1 removes the sights and mans the pole in the bore.

Nos. 2 and 3 release the cap-squares and man the wheels.

Nos. 4 and 5 each pass the loop end of a drag-rope between the hydraulic buffer and lower spring cover under the breech to the opposite side; each number then grasps the other's loop end and brings it through the same way until the centre of each drag-rope is under the breech. The ends held together on each side are then passed outside the tire of the wheels on the same level as the breech (the howitzer first having been depressed to the greatest extent), two turns taken round the felloe, one on each side of a spoke (to prevent slipping), and made fast with two half hitches round the felloe. They then man the wheels.

No. 6 goes to the traversing handspike, and attends to elevating gear.

No. 7 brings up the drag-ropes to Nos. 4 and 5.

Nos. 7 and 8 man the wheels.

No. 9 places the pole in the bore (loop end first) and mans it.

2 spare numbers assist to lift at the pole.

1 spare number on each wheel.

At the order "Dismount the gun"—

The numbers at the pole lift the howitzer clear of the trunnion holes, and keep it horizontal; the numbers on the wheels man them forward, No. 6 working the elevating wheel until the arc is clear. The howitzer is lowered on to handspikes or small skidding. The ropes are then cast off by Nos. 4 and 5.

At the order "Dismount the carriage"—

Nos. 2, 3, 4, and 5 go to the carriage; Nos. 2 and 3 in rear; 4 and 5 in front.

Nos. 6, 7, 8, and 9 go to the wheels, Nos. 6 and 7 in front; 8 and 9 in rear.

Nos. 8 and 9 take off linchpins and washers.

At the order "Lift"—

The carriage is lifted and the wheels taken off.

At the order "Lower"—

The wheels are placed dish down, and the carriage is lowered to the ground.

TO MOUNT THE HOWITZER AND CARRIAGE.*Section Commander.*

Mount No. — Gun and
Carriage.

No. 1.

Mount the Carriage—Lift.
Prepare to Mount the Gun.
Mount the Gun.

This is exactly the opposite to the dismounting just described.

Note.—Limbers and wagons are mounted and dismounted in a similar way, the pole having been previously removed.

DISABLED ORDNANCE.

Whenever operations are not described in detail, or numbers are not told off to particular duties, the No. 1 will order such duties to the several numbers as may be required.

Operations can thus be carried out without confusion, though no precise detail has been laid down.

TO REPLACE A DAMAGED WHEEL.

Should a howitzer wheel be disabled in action, it should be immediately turned so as to bring the sound portion on to the shoe, and if necessary lashed, and notice should be sent to the captain.

The latter will immediately send up one of the spare wheels, which will be brought alongside the damaged one and the wheels changed as follows:—

<i>Section Commander.</i>	<i>No. 1.</i>
No. ——— Change Wheels.	No. ——— Change Wheels. Lift—Lower.

At the order No. ——— Change wheels from the No. 1—

Nos. 1 and 6 go to the damaged wheel, No. 1 in rear, No. 6 removes the linchpin and washer.

Nos. 2, 3, 4, and 5 man the traversing handspike, which is placed under the axle-tree by Nos. 2 or 3 (according to side), Nos. 8 and 9 lay hold of the top of the opposite wheel, and by hauling on it assist.

At the order "Lift"—

The axle-tree is lifted and the damaged wheel is taken off, No. 6 rolls it out of the way, and the new one is put on by the numbers who have brought it up.

At the order "Lower"—

The carriage is lowered, the linchpin and washer put on by No. 6, the handspike replaced by Nos. 2 or 3, and all resume their duties in action.

The damaged wheel is either left on the ground, or removed by the numbers who brought up the new one, as the captain may have directed.

TO REMOVE THE HOWITZER AND CARRIAGE BY A LIMBER.

The howitzer is dismounted, the horses are taken out, the limber is run over the howitzer, so that the breech is towards the pole, and the trunnions under the limber hook; the muzzle and pole are raised, and the howitzer slung with a drag-rope round the trunnions to the limber hook, the end is passed to the front, and the muzzle borne down, a half hitch taken round the breech and made fast to the centre futchell.

The carriage is dismounted and turned over by all the numbers, with the trail towards the pole; it is then lifted, trail first, up the front of the limber on to the top of the boxes, until the weight is balanced for draught.

The trail is secured by a drag-rope to a handspike in the bore, the side-arms are strapped to the trail, the wheels are placed dish down, on the top of the carriage, securely lashed with drag-ropes to the limber hook, and to the pole in front.

TO REMOVE A HOWITZER AND CARRIAGE BY A WAGON.

The howitzer is slung to a limber as before, the carriage is turned over, and the trail rested on the rear of the wagon. It is then lifted by all the numbers on to the wagon body until the trail eye nearly touches the limber boxes (a piece of wood being placed underneath the bracket to protect the boxes); it is secured to the perch by a drag-rope. The wheels are placed dish down, on the top of the carriage, and lashed.

LIST OF STORES.

Carriage.

Article.	No.	Where carried.
Carriage, B.L., 5-inch, howitzer ..	1	
Bits, vent, 11-inch	1	On right bracket (inside).
Boxes, tool, leather	1	Between side brackets.
Brushes, spoke	1	In leather box, between brackets.
Brushes, piaseaba	1	Between side brackets.
Buckets water, G.S., leather ..	2	On breast chain rings.
Cans, oil lubricating, No. 9 ..	1	Between side brackets.
Covers, breech	1	Strapped to top transom, when not on howitzer.
Hammers, claw, 20 oz.	1	In leather box, between side brackets.
Handspikes, traversing, No. 1..	1	On top of left side bracket.
Keys, fuze, universal	1	In pocket, on left tensile stay.
Oil, Rangoon pints	$\frac{1}{2}$	In oil can.
Pincers, carpenters' pairs	1	In leather box, between brackets.
Posis, aiming	2	On left side bracket.
Pockets { key, fuze, universal ..	1	On left tensile stay.
{ tube, special	1	On right side bracket.
Rimers, vent, "T"	1	On right bracket (inside).
Rods, vent, 11-inch	1	" " "
Spanners { McMahon, 15-inch ..	1	} In leather box, between brackets.
{ hydraulic buffer { No. 77	1	
{ " 79	1	
Staves, end, B.L., 5-inch, howitzer ..		Under left side bracket.
Tampeons		Strapped to axle-tree, right side, when not in howitzer.

Carriage Limber.

Article.	No.	Where carried.
Axes { felling, curved helve	1	On platform board.
{ pick { heads	1	} Under limber.
{ helves, 34 $\frac{1}{2}$ inch ..	1	
Blankets, G.S.	2	On top of box.
Boxes, fuze, No. 23	2	In upper compartment of limber box.
" grease, 3 lb.	1	Rear of axle-tree, "near" side.
" obturating pads	1	In box on footboard, "near" side.
" vent, pads, and discs	1	On footboard "near" side.
Bolts, stop	1	In lower tray for gun fittings, limber box.
Brushes, water, carriage	1	Under limber, "near" side.
Buckets, water, G.S., leather ..	2	Under limber.
Cans, oil, lubricating, No. 3 ..	1	} Rear of axletree, "Near" side.
Cases, can, lubricating, No. 3 ..	1	
Cartouches, small	1	} In upper compartment, limber box.
" large	1	

Carriage Limber—continued.

Article.	No.	Where carried.
Cartridges, 11- $\frac{7}{16}$ oz. cordite, size 3 $\frac{1}{2}$..	21	In cartouches.
Clamps, tangent, sight	2	In lower tray for gun fittings, limber box.
Clinometers, large	1	In box rear of axletree, "off" side.
Collars, actuating, "T" tube	1	In lower tray for gun fittings, limber box.
Couples, trace	2	In upper tray for gun fittings, limber box.
Covers, cartridges	21	On cartridges.
Discs, pad, { adjusting	2	} In obturating pad box.
{ obturating protecting	3	
Drivers, screw, G.S., 6-inch	1	In upper tray for gun fittings, limber box.
Fuzes, percussion, D.A. No. 3, Mark II time and percussion, middle, No. 54, Mark II.	15	} In fuze boxes.
Grease, Field's lb.	3	
Hooks, bill	1	In grease box.
Keys, fuze, universal	2	Under limber, "off" side.
" spring lock	1	On lid of limber box, in pocket.
Kettles, camp, oval, 12 qts.	1	Under limber, "near" side.
Lanyards, friction tube "T"	2	In upper tray for gun fittings, limber box.
Lever, cam, with hinge bolt, and keep pin	1	} In lower tray for gun fittings
Links, actuating collar, with axis pin..	1	
Oil, Rangoon pint	1	limber box.
Pads, obturating	3	In oil can.
Plates, preserving, bracket fore sight†	2	In obturating pad box.
Pins, linch-, second class (spare)	1	In upper tray for gun fittings, limber box.
" keep hinge, bolt carrier ring ..	2	limber box.
" cam lever	2	Under footboard.
Rimers, vent, "T"	1	In lower tray for gun fittings, limber box.
Ropes, drag, heavy pair	1	In upper tray for gun fittings, limber box.
Shell, Shrapnel	6	On footboard.
" common	13	In limber box.
Shot, case	2	} In lower tray for gun fittings, limber box.
Sights, cross-bar { tangent	2	
fore { right	1	} In lower tray for gun fittings, limber box.
" left	1	
Springs, catch, cam lever	6	} In lower tray for gun fittings, limber box.
" retaining vent axial ..	6	
" latch, " carrier ring ..	6	
" clip, " "	6	} In upper tray for gun fittings, limber box.
Straps, carrying projectile " " ..	1	
Spades, N.P.	2	In upper tray for gun fittings, limber box.
Swingle-trees, No. 7 .. (spare)	1	On ends of limber box.
Straps, securing, 1" x 44" (camp kettle lids)	1	On footboard.
Tubes, "T," friction	30	On lids of kettle.
Vents, "T," axial	1	In fuze boxes.
Washers, drag, 2nd class, "C" (spare)	1	In box, on footboard, "near" side.
" with Q	1	} Under footboard.
Wrenches, breech-mechanism "A" ..	1	
		In upper tray for gun fittings, limber box.

* When not in action, these keys will be carried in the upper tray, in limber box.

† When not on howitzer.

Wagon, Ammunition.

Article.	No.	Where carried.
Blankets, G.S.	2	On top of ammunition box.
Boxes, fuze, No. 22	3	In upper compartment, ammunition box.
„ grease magazine, 14-lb.	2	Rear of axletree.
„ lantern, bull's eye	1	On footboard, "near" side.
Cartouches, large	2	In upper compartment, ammunition box.
Cartridges, 11 $\frac{1}{4}$ -oz., cordite, size 3 $\frac{1}{4}$.. .	24	In cartouches.
Cases, saw, hand	1	On lid of ammunition box.
„ pocket, tube	1	On tensile stay, "near" side.
Collars, sliding	1	In tray, upper compartment, ammunition box.
Covers, cartridge	24	On cartridges.
Cutters, wire	1	In tray, upper compartment.
Fuzes, percussion, D.A., No. 3, Mark II. . .	15	} In fuze boxes.
„ time and percussion, middle, No. 54, Mark II.	8	
Grease, Field's lb.	28	In grease boxes.
Handspikes, traversing, No. 1.	1	} Under perch.
„ common, 6-ft.	1	
Hold-alls, needler, and silk twist .. .	1	} In tray, upper compartment, ammunition box.
Keys, powder case	1	
„ fuze, universal	2	} On lid of ammunition box, in pocket.
„ spring lock	1	
Kettles, camp, oval, 12-qt.	2	Under wagon.
Knives, clasp	1	In tray, upper compartment, ammunition box.
Lashings, tarred, 1-inch, 10-feet .. .	2	On axle-tree.
Lanterns, bull's-eye	1	In box lantern.
Mauls, G.S.	1	Under wagon.
Needles, magazine, nickel silver, 4-inch . .	2	In hold-all, needles, and silk twist.
Posts, picket, 2 $\frac{1}{2}$ feet	6	Under wagon.
Saws, hand, 26-inch	1	In case, lid of ammunition box.
Scissors, magazine pair . . .	1	In tray, upper compartment, ammunition box.
Shell { Shrapnel.	8	} In ammunition box.
„ { common	16	
Shoes, drag, No. 3	1	On perch.
Silk twist oz.	2	In hold-all, needles, and silk twist.
Tubes, friction, "T"	30	In fuze boxes.
„ „ „ drill.	1	In tray, upper compartment, ammunition box.

Wagon Limber.

Article.	No.	Where carried.
Axes { felling, curved helve	1	On platform board.
„ { head, 6 $\frac{1}{2}$ -lb.	1	} Under limber.
„ { pick { helves, 34 $\frac{1}{2}$ -inch	1	
Blankets, G.S.	2	On top of box.
Boxes, fuze, No. 23	2	In upper compartment of limber box.
„ grease, 3-lb.	1	Rear of axletree, "near" side.
Buckets, water, G.S.	2	} Under limber.
Brushes, water, carriage	1	

Wagon Limber—continued.

Article.	No.	Where carried.
Cartouches, small	1	} In upper compartment, limber box.
" large	1	
Cartridges, 11 ⁷ / ₁₀ oz., cordite, size 3 ³ / ₄ ..	21	In cartouches.
Clinometer, large*	1	In box, rear of axletree, "off" side.
Couples, trace	2	In upper tray for gun fittings, limber box.
Covers, cartridge	21	On cartridges.
Fuzes, percussion, D.A., No. 3, Mark II	15	} In fuze boxes.
" time and percussion, middle, No. 54, Mark II	6	
Grease, Field's lb.	3	In grease boxes.
Hooks, bill	1	Under limber, "off" side.
Jacks, lifting, G.S.	1	On footboard.
Keys, fuze, universal	2	On lid of limber box, in pocket.
" spring lock	1	On lid of ammunition box, in pocket.
Kettles, camp, oval, 12-qt.	1	Under limber, "near" side.
Lanyards, friction tube, "T"	2	In upper tray for gun fittings, limber box.
Pins, linch-, second class (spare)	1	Under footboard.
Ropes, drag, heavy pairs	1	On footboard.
Shell, Shrapnel	6	} In limber box.
" common	13	
Shot, case	2	} On ends of limber box.
Spades, N.P.	2	
Swingle-trees, No. 7	1	On footboard.
Straps, carrying projectiles	1	In upper tray for gun fittings, limber box.
" securing, 1" x 44" (camp kettle lids)	1	On lids of kettle.
Tubes, "T," friction	30	In fuze boxes.
Washers, drag, second class, "C" (spare)	1	Under footboard.

* Spare, per section only.

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DETAILS OF EQUIPMENT.

54
Artillery
2844

FIELD BATTERIES.

B.L. 5-inch Howitzer.

(Service Batteries.)

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SET OF TOOLS.

CHEST, TOOL, FILLED, No. 10.
(Carriage, Smiths', R.A., Field.)

Articles.										No.	
Woolwich Store Charge, No. 7.											
Chest, tool, empty, No. 10	..	..	..	..	..	..	..	..	..	1
Aprons, basil, brown	..	..	..	..	..	..	..	..	..	4
Braces	{	smiths', bits	{	countersink rose	..	..	..	..	..	1
				rimer	{	half-round	1
						square	1
				ratchets, 9-inch	..	..	..	..	..	1
				drills, Nos. 1 to 11	..	..	..	..	..	11
Callipers	{	6-inch	..	..	..	..	..	..	pair	1
		4 " inside	..	..	..	..	..	..	"	1
Cans, oil, lubricating, G.S.	..	..	..	..	..	..	..	..	..	1
Chisels	{	cross-cut, 7 in. x 1-in.	..	..	..	..	..	..	..	1
		engraving	..	..	..	..	..	..	..	1
		hand, cold, 1-in. x 8 in.	..	..	..	..	..	..	..	1
		rivet-head	..	..	..	..	..	..	..	1
		smiths' {	hot	..	..	..	..	..	..	2
		cold	..	..	..	..	..	..	1	
Cutters, anvil, 2-inch	..	..	..	..	..	..	..	..	..	1
Dividers, spring, 6-inch	..	..	..	..	..	..	..	..	..	1
Drivers, screw, G.S., 6-inch	..	..	..	..	..	..	..	..	..	1
		flat, 14-inch	..	..	..	..	..	..	..	2
		" 10 "	..	..	..	..	..	..	..	2
Files	{	bastard	{	12-inch	..	..	..	..	..	1
				8 "	..	..	..	..	..	1
		round		10 "	..	..	..	..	..	1
				6 "	..	..	..	..	..	2
		second cut, safe edge, 6 "	..	..	..	..	..	..	3	
Flatters, smiths'	..	..	..	..	..	..	..	..	..	1
Fullers	{	bottom	..	..	..	..	..	..	..	1
		top	..	..	..	..	..	..	..	1
Hammers	{	fitters', 32-oz.	..	..	..	..	..	..	..	1
		" 8 "	..	..	..	..	..	..	1	
		smiths', hand, 3-lb.	..	..	..	..	..	..	1	
Handles, file	{	middling	..	..	..	..	..	..	2	
		small	..	..	..	..	..	..	1	
Holders, rivet-head, small	..	..	..	..	..	..	..	..	..	1
Woolwich Store Charge, No. 8.											
Plate, screw, 10 taps, 20 holes	..	..	..	..	..	..	..	..	..	1
Pliers, side-cutting, 7-inch	..	..	..	..	..	..	..	..	..	1
Pokers, smiths'	..	..	..	..	..	..	..	..	..	1*
Punches	{	centre, 4 1/2-inch	..	..	..	..	..	..	..	1
		round, 1/2 " x 10-inch	..	..	..	..	..	..	1	
		smiths', hot	{	1/2-inch	..	..	..	..	1	
		"	{	3/8 "	..	..	..	..	1	
Rods, smiths', iron	..	..	..	..	..	..	..	..	..	4
Rules	{	armament artificers', 1-foot	..	..	..	..	..	..	..	1
		saddle-tree maker's	..	..	..	..	..	..	1	
Saws	{	cutting metal, 10-inch	..	..	..	..	..	..	..	1
		" " blades, 10-inch	..	..	..	..	..	..	2	
Scribers	..	..	..	..	..	..	..	..	..	1
Slices, farriers'	..	..	..	..	..	..	..	..	..	1*
Snaps, hand	{	1 1/2-inch	..	..	..	..	..	..	..	1
		" 1 3/4 "	..	..	..	..	..	..	1	
Squares	{	smiths', steel	..	..	..	..	..	..	..	1
		fitters'	..	..	..	..	..	..	1	
		" box, steel, 4-inch, marked	..	..	..	..	..	..	..	1

* Carried separately in rear compartment with forge when packed in forge wagon.

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D

Articles.										No.		
Woolwich Store Charge, No. 8—continued.												
Stocks, drill, bevel-wheel	1		
Tonges, smiths' { fore bit	..	..	..	..	..	..	..	..	..	1
{ hollow bit	..	..	..	..	..	..	..	..	..	1
Tools, rounding bottom	..	..	..	..	..	..	..	..	..	1
Travellers ..	..	..	..	..	..	..	..	..	..	1
Vice, hand, 16-oz.	..	..	..	..	..	..	..	..	..	1
Wrench, tap, small	..	..	..	..	..	..	..	..	..	1
Woolwich Store Charge, No. 19.												
Cloths, sponge	..	..	..	..	..	..	..	..	..	4
Woolwich Store Charge, No. 26.												
Stones, rag	..	..	..	..	..	..	..	..	..	2
Miscellaneous.												
Handbook, military artificer's	..	..	..	..	..	..	..	..	..	1
The undermentioned are not carried in the chest, and will be separately demanded, charged, and accounted for.												
Woolwich Store Charge, No. 7.												
Chests, stocks and dies, Whitworth thread, 1-inch to $\frac{3}{4}$ -inch, filled	..	..	..	..	..	..	..	..	..	1
Detail of Stocks and Dies.												
Chests, stock and dies, Whitworth thread	dies	{	1-inch	set	1	
			$\frac{7}{8}$ "	1	
			$\frac{3}{4}$ "	1	
	spanners	{	$\frac{3}{4}$ "	1	
			$\frac{7}{8}$ "	1	
			1 " "	1	
	stocks	{	D	1	
			C	1	
				1	
	taps	{	1 " { plug	1
			1st turn	1
			2nd " "	1
			$\frac{7}{8}$ " { plug	1
			1st turn	1
			2nd " "	1
			$\frac{3}{4}$ " { plug	1
			1st turn	1
			2nd " "	1
			$\frac{1}{2}$ " { plug	1
			1st turn	1
			2nd " "	1
	wrenches	{	$\frac{1}{16}$ " { plug	1
			1st turn	1
			2nd " "	1
$\frac{1}{8}$ " { plug			1	
1st turn			1	
2nd " "			1	

CHEST, TOOL, FILLED, 3 F.
(Wheelers, R.A., Field.)

Articles.										No.
<i>Woolrich Store Charge, No. 7.</i>										
Chest, tool, empty, No. 3 ..	..	..	..	..	..	..	..	..	..	1
Adapter, brace ..	..	..	..	..	..	..	..	..	..	1
Adzes, carpenters' { heads ..	..	..	..	..	..	..	..	..	..	2
Adzes, carpenters' { handles ..	..	..	..	..	..	..	..	..	..	1
Aprons, basil, white ..	..	..	..	..	..	..	..	..	..	1
Augers	{	shell	14-inch ..	..	..	..	..	..	..	1
			1 1/16 " ..	..	..	..	..	..	..	1
			1 " ..	..	..	..	..	..	..	1
			7/8 " ..	..	..	..	..	..	..	1
			3/4 " ..	..	..	..	..	..	..	1
			5/8 " ..	..	..	..	..	..	..	1
			3/8 " ..	..	..	..	..	..	..	1
			16 " ..	..	..	..	..	..	..	1
		handles	13 1/2 " ..	..	..	..	..	..	..	1
			12 " ..	..	..	..	..	..	..	1
Awls	{	blades, brad ..	..	..	..	..	..	..	..	12
		handles, brad { large ..	..	..	..	..	..	..	..	2
			small ..	..	..	..	..	..	..	2
Axes, hand, 3-lb ..	..	..	..	..	..	..	..	..	..	1
Bags, tool, carpenters' ..	..	..	..	..	..	..	..	..	..	1
Bevels, steel blade, 12-inch ..	..	..	..	..	..	..	..	..	..	1
Braces, carpenters' ..	..	..	..	..	..	..	..	..	..	7
Centre, 1 1/2, 1, 3/4, 3/8, 1/2, and 3/8-inch ..	..	..	..	..	..	..	..	..	..	1
Countersink	{	flat ..	..	..	..	..	..	..	..	1
		rose ..	..	..	..	..	..	..	..	1
Dowling sash ..	..	..	..	..	..	..	..	..	..	1
Gouge, 7/16, 3/8, 1/2, 5/8, 3/4, and 1/2-inch ..	..	..	..	..	..	..	..	..	..	6
Nose, 3/8, 1/2, 3/4, 5/8, and 1/2-inch ..	..	..	..	..	..	..	..	..	..	6
Rimer, square ..	..	..	..	..	..	..	..	..	..	1
Screwdriver ..	..	..	..	..	..	..	..	..	..	1
Taper ..	..	..	..	..	..	..	..	..	..	1
Braces, smiths' ..	..	..	..	..	..	..	..	..	..	1
Callipers, 6-inch ..	..	..	..	..	..	..	..	..	pair	1
Can, oil, lubricating, G.S. ...	..	..	..	..	..	..	..	..	..	1
Chisels	{	firmer, coachmakers'	cross-cut, 7-inch x 1/4-inch ..	..	..	..	..	..	..	2
			1 1/4-inch ..	..	..	..	..	..	..	1
			1 1/2 " ..	..	..	..	..	..	..	1
			1 " ..	..	..	..	..	..	..	1
			3/4 " ..	..	..	..	..	..	..	1
			5/8 " ..	..	..	..	..	..	..	1
			3/8 " ..	..	..	..	..	..	..	1
			hand, cold, 3/4-inch x 8 " ..	..	..	..	..	..	..	2
			mortice, 1/4-inch ..	..	..	..	..	..	..	1
			Compasses, wing, 7 " ..	..	..	..	..	..	..	1
Dividers, spring, 6 " ..	..	..	..	..	..	..	..	..	pair	1
Drifts, steel, round	{	5/8 inch ..	..	..	..	..	..	..	..	1
		1/2 " ..	..	..	..	..	..	..	..	1
		3/8 " ..	..	..	..	..	..	..	..	1
		1/4 " ..	..	..	..	..	..	..	..	1
		3/16 " ..	..	..	..	..	..	..	..	1
Drivers, screw, G.S.	{	14 " ..	..	..	..	..	..	..	..	1
		6 " ..	..	..	..	..	..	..	..	1
		flat 14-inch	1
Files	{	bastard { round { 10 "	2
			6 "	2
			3-square, 14 "	1
		saw, 3-square { hand, 5 1/2 "	4
			tenon, 4 "	4

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CHEST, TOOL, FILLED, 3 F—continued.

Articles.										No. —
<i>Woolwich Store Charge, No. 7—continued.</i>										
Gauges, carpenters'	{	marking ..	..	..	..	..	..	..	..	1
		mortice ..	..	..	..	..	..	..	..	1
Gimlets, common	{	$\frac{3}{16}$ -inch ..	..	..	..	..	..	..	..	2
		$\frac{1}{4}$ " ..	..	..	..	..	..	..	..	1
		1 " ..	..	..	..	..	..	..	..	1
Gauges	{	firmer	{	$\frac{3}{4}$ " ..	..	..	..	..	..	1
				$\frac{1}{2}$ " ..	..	..	..	..	..	1
		pecking, 1	"	..	..	..	..	..	..	1
				32-oz. ..	..	..	..	..	..	1
		fitters'	{	16 " ..	..	..	..	..	..	1
				8 " ..	..	..	..	..	..	1
		riveting, 24	"	..	..	..	..	..	..	1
Hammers	{	smiths' sledge, 10-lb	..	..	..	..	..	..	..	1*
		screw	..	..	..	..	..	..	..	1
		handles	{	36-inch ..	..	..	..	..	..	1†
				14 " ..	..	..	..	..	..	1
Handles, file	{	middling ..	..	..	..	..	..	..	..	2
		small ..	..	..	..	..	..	..	..	1
<i>Woolwich Store Charge, No. 8.</i>										
Knives, drawing, carpenters'	..	..	..	..	..	..	..	..	..	1
Lines, carpenters'	..	..	..	..	..	..	..	..	..	1
Mallets	..	..	..	..	..	..	..	..	..	1
Pencils, carpenters'	..	..	..	..	..	..	..	..	..	6
Pincers,	..	..	..	..	..	..	..	..	pairs	1
	{	bead ..	..	..	..	..	..	..	..	2
		compass ..	..	..	..	..	..	..	..	1
Planes	{	jack, double, iron	..	..	..	..	..	..	..	1
		plough ..	..	..	..	..	..	..	..	1
		smoothing, G.S. ..	..	..	..	..	..	..	..	1
		rabbet, skew ..	..	..	..	..	..	..	..	1
Pots, glue, 1-pint ..	..	..	..	..	..	..	..	..	..	1
Punches	{	carpenters', small	..	..	..	..	..	..	..	1
		steel, centre, $4\frac{1}{2}$ -inch ..	..	..	..	..	..	..	..	1
Reels, carpenter's line ..	..	..	..	..	..	..	..	..	..	1
Rules	{	carpenters' common	..	..	..	..	..	..	..	1
		saddle-tree makers'	..	..	..	..	..	..	..	1
		compass ..	..	..	..	..	..	..	..	1
Saws	{	dovetail, brass back	..	..	..	..	..	..	..	1
		hand, 24-inch ..	..	..	..	..	..	..	..	1
		tenon, 14 " ..	..	..	..	..	..	..	..	1
Screws, thumb ..	..	..	..	..	..	..	..	..	..	1
Scribers ..	..	..	..	..	..	..	..	..	..	1
Sets, saw, hand ..	..	..	..	..	..	..	..	..	..	1
Shaves, spoke	{	$3\frac{1}{2}$ -inch ..	..	..	..	..	..	..	..	1
		$2\frac{1}{2}$ " ..	..	..	..	..	..	..	..	1
Squares, carpenters', 9-inch	..	..	..	..	..	..	..	..	..	1
Stones, oil	{	carpenters' ..	..	..	..	..	..	..	..	1
		slip, Turkey ..	..	..	..	..	..	..	..	1
Tongs, wheelers ..	..	..	..	..	..	..	..	..	..	1
<i>Woolwich Store Charge, No. 11.</i>										
Chalk, white ..	..	..	..	..	..	..	..	..	lb.	1

* Included with Ordnance Stores, page 84.

† Carried separately with forge wagon.

CHEST, TOOL, FILLED, 3 F--continued.

Articles.	No.
<i>Woolwich Store Charge, No. 18.</i>	
Cloths, sponge	4
<i>Woolwich Store Charge, No. 25.</i>	
Brushes, paint, sash tool, No. 6 (for glue)	1
<i>Weedon Store Charge.</i>	
Pliers, flat-nose pairs	1
<i>Miscellaneous.</i>	
Handbook, military artificers'	1

CHEST, TOOL, FILLED, NO. 5A.
(Collarmakers and Saddlers.)

Articles.										No.
Weedon Store Charge.										
Pliers, flat-nose	pairs	1
Woolwich Store Charge, No. 7.										
Chest, tool, empty, No. 5..	1
Awls	{	blades	backing	6
			buckling	{ 4-inch	3
				{ 2 3/4 "	6
			drawing	2
			garnishing	{ 2 1/2-inch	2
				{ 1 7/8 "	2
			harness	{ 1 1/2 "	3
				{ 1 3/4 "	4
		{ 1 5/8 "		..	..	..	..	..	4
		{ 1 3/4 "		..	..	..	..	..	4
		{ 1 1/2 "		..	..	..	..	..	3
		{ 1 3/8 "		..	..	..	..	..	2
		pannel	{ 5 1/4 "	..	..	..	..	..	2
			{ 4 "	..	..	..	..	..	4
		handles	drawing	4
			harness	4
pannel	..		..	..	..	..	..	4	
Bones, hollow	..	..	..	..	..	..	..	..	1
Chisels, hand, cold, 3/4-inch x 8-inch	..	..	..	..	..	..	..	..	1
Clams, collarmakers'	..	..	..	..	..	..	..	pairs	1
Claws, nail	..	..	..	..	..	..	..	..	1
Compasses, common, 7-inch	..	..	..	..	..	..	..	pairs	1
Creases { double	..	..	..	..	..	..	..	..	1
{ single	..	..	..	..	..	..	..	..	1
Drivers, screws, G.S., 6-inch	..	..	..	..	..	..	..	..	1
Gimlets, common, 1/2-inch..	..	..	..	..	..	..	..	..	1
Hammers { collarmakers'	..	..	..	..	..	..	..	..	1
	{ 24-oz..	..	..	..	..	..	..	..	1
		{ 8 "	..	..	..	..	..	..	1
{ riveting { saddle-seat	..	..	..	..	..	..	..	1	

CHEST, TOOL, FILLED, No. 5A—continued.

Articles.										No.
Woolwich Store Charge, No. 7—continued.										
Irons	collar	{ 34-inch .. .. .		..	..	..	..	..	..	1
		{ 29 " .. .. .		..	..	..	..	..	..	1
	pricking	{ 23 " .. .. .		..	..	..	..	..	..	1
		{ 12-stitch .. .. .		..	..	..	..	..	..	1
		{ 8 " .. .. .		..	..	..	..	..	..	1
	{ 5 " .. .. .		..	..	..	..	..	..	1	
	{ seat, stuffing, 14-inch .. .. .		..	..	..	..	..	..	..	1
Woolwich Store Charge, No. 8.										
Knives	{ clasp .. .. .		..	..	..	..	..	..	..	1
	{ gauge-plough .. .. .		..	..	..	..	..	..	..	1
	{ half-round .. .. .		..	..	..	..	..	..	..	1
	{ head .. .. .		..	..	..	..	..	..	..	1
Lead, punching, collarmakers', 8-lb.										
Mallets	{ collar .. .. .		..	..	..	..	..	..	..	1
	{ tinman's .. .. .		..	..	..	..	..	..	..	1
Needles	collar	half-moon	{ 6½-inch .. .. .		..	..	..	..	..	1
			{ 5½ " .. .. .		..	..	..	..	..	1
			{ 4½ " .. .. .		..	..	..	..	..	2
		packing	{ 1 .. .. .		..	..	..	..	..	2
			{ 2 .. .. .		..	..	..	..	..	2
			{ 3 .. .. .		..	..	..	..	..	3
	darning, 4-inch harness	saddlers'	{ 4 .. .. .		..	..	..	..	..	3
			{ 5 .. .. .		..	..	..	..	..	3
			{ 6 .. .. .		..	..	..	..	..	6
		{ sewing .. .. .		..	..	..	..	..	100	
		{ stitching .. .. .		..	..	..	..	..	100	
		{ .. .. .		..	..	..	..	..	25	
Palms, collarmakers'										
Pincers, saddlers' pair										
Punches, oval	{ No. 31 .. .. .		..	..	..	..	..	..	..	1
	{ " 30 .. .. .		..	..	..	..	..	..	..	1
	{ " 28 .. .. .		..	..	..	..	..	..	..	1
	{ " 27 .. .. .		..	..	..	..	..	..	..	2
	{ " 24 .. .. .		..	..	..	..	..	..	..	1
	{ " 23 .. .. .		..	..	..	..	..	..	..	1
	{ " 22 .. .. .		..	..	..	..	..	..	..	2
	{ " 20 .. .. .		..	..	..	..	..	..	..	2
Rasps, shoemakers', 10-inch										
Rules, collarmakers', 4-fold										
Scissors, tailors' pair										
Shaves, collarmakers'										
Spikes, marine, wood										
Thimbles, tailors'										
Tools, edge	{ No. 1 .. .. .		..	..	..	..	..	..	..	1
	{ " 2 .. .. .		..	..	..	..	..	..	..	1
	{ " 3 .. .. .		..	..	..	..	..	..	..	1
Woolwich Store Charge, No. 26.										
Stones	{ rag .. .. .		..	..	..	..	..	..	..	1
	{ rub, scythe .. .. .		..	..	..	..	..	..	..	1
Steels, butchers'										
The undermentioned are not carried in the chest, and will be separately demanded, charged, and accounted for:—										
Woolwich Store Charge, No. 7.										
*Cards, towing, small pair										

* Towing cards will not be issued unless specially demanded. When issued to batteries, they will be carried in the forge wagon limbers.

FORGE AND SHOEING TOOLS.

Articles.										No.
FORGE TOOLS.										
<i>Woolwich Store Charge, No. 7.</i>										
Chests, tool, empty, No 7.	..	..	..	..	..	..	..	..	..	1
Chisels, farriers', handled	..	..	..	..	..	..	..	..	..	2
Cresses (set of 2)	..	..	..	..	..	..	..	..	set	1
Cutters, anvil { nail	..	..	..	..	..	..	..	..	..	1
flat	..	..	..	..	..	..	..	..	..	1
half-round	..	..	..	..	..	..	..	..	..	2
Fuller's, farriers'	..	..	..	..	..	..	..	..	..	2
Hammers { farriers', pointing	..	..	..	..	..	..	..	..	..	1
„ sledge	..	..	..	..	..	..	..	..	..	2
„ turning	..	..	..	..	..	..	..	..	..	1
<i>Woolwich Store Charge, No. 8.</i>										
Pokers, smiths'†	..	..	..	..	..	..	..	..	..	1
Pritchels, farriers'	..	..	..	..	..	..	..	..	..	4
Slices, farriers'‡	..	..	..	..	..	..	..	..	..	1
Stakes, farriers'	..	..	..	..	..	..	..	..	..	1
Stamps, farriers'	..	..	..	..	..	..	..	..	..	2
Tongs { farriers', fire	..	..	..	..	..	..	..	..	..	1
turning { large	..	..	..	..	..	..	..	..	..	1
medium	..	..	..	..	..	..	..	..	..	1
small	..	..	..	..	..	..	..	..	..	1
SHOEING TOOLS.										
<i>Woolwich Store Charge, No. 7.</i>										
Aprons, basil	..	..	..	..	..	..	..	..	..	8
Bags, tool, farriers'	..	..	..	..	..	..	..	..	..	4*
Buffers, farriers'	..	..	..	..	..	..	..	..	..	4
Hammers, farriers', shoeing	..	..	..	..	..	..	..	..	..	4
<i>Woolwich Store Charge, No. 8.</i>										
Knives { drawing, farriers'	..	..	..	..	..	..	..	..	..	4
searching	..	..	..	..	..	..	..	..	..	4
Pincers, farriers'	..	..	..	..	..	..	..	..	pairs	4
Rasps, farriers', 16-inch	..	..	..	..	..	..	..	..	..	4 per quarter.
<i>Woolwich Store Charge, No. 26.</i>										
Stones, rag, farriers'	..	..	..	..	..	..	..	..	..	4

Note.—The above list of shoeing tools constitutes four sets; the additional set or sets of tools should be held in reserve with remainder of station equipment.

*One for each division in the event of being detached.

†To be carried strapped inside the bale hoops of the forge wagon.

‡When packing for war the poker and slice will be returned to store, the poker and slice forming part of the No. 10 chest, and carried in the forge wagon, being available.

WAR ESTABLISHMENT.

54
Arty.
2571

Ranks.	No.	Remarks.
<i>Officers—</i>		
Major	1	
Captain	1	
Lieutenants and 2nd Lieutenants ..	3	
<i>Non-Commissioned Officers and Men—</i>		
Battery Sergeant-Major ..	1	
„ Quartermaster-Sergeant ..	1	
Sergeants	6	
Sergeant Farrier	1	
Corporals	6	
Bombardiers	9	
Shoeing Smiths	4	
Collarmakers	2	
Wheelers	2	
Trumpeters	2	
Gunners	*86	* Including 1 to be left at- base as Storeman.
Drivers	74	
Total	199	
<i>Riding Horses and Single Sets of Appointments—</i>		
Officers	5	
Staff Sergeants	2	
Sub - Division Non - Commissioned Officers	6	
Corporals or Bombardiers	6	
Farrier	1	
Smith	1	
Trumpeters	2	
Spare	5	
Total	28	
<i>Draught Horses and Single Sets of Harness—</i>		
Howitzers	36	
Ammunition wagons	54	
Artillery wagons	12	
Ammunition and store wagons ..	8	
Forge, R.A.	6	
Store, R.A.	4	
Spare wheel	9	
Total	129	
<i>Carriages and Wagons—</i>		
Howitzer carriages	6	
Ammunition wagons	9	
Artillery wagons	3	
Ammunition and store wagons ..	2	
Forge wagon	1	
Store wagon	1	
Total	22	

WAR ESTABLISHMENT IN ORDER OF SUB-DIVISIONS.

	Sub-Divisions.						Total.	Remarks.
	1	2	3	4	5	6		
Officers and Men	Major .. ..	..	..	..	..	..	1	
	Captain .. ..	..	..	..	..	..	1	
	Lieutenants and 2nd Lieutenants	..	..	..	..	..	3	
	Staff Sergeants .. ..	..	..	..	..	..	2	
	Sergeants .. ..	..	..	..	..	..	6	
	Sergeant Farrier .. ..	..	..	..	..	..	1	
	Corporals .. ..	..	..	..	..	..	6	
	Bombardiers .. ..	..	..	..	..	..	1	
	Shoeing Smith .. ..	..	..	..	..	..	6	
	Collarmakers .. ..	..	..	..	..	..	9	
	Whealers .. ..	..	..	..	..	..	4	
	Trumpeters .. ..	..	..	..	..	..	2	
	Drivers .. ..	..	..	..	..	..	2	
	Total	32	33	34	32	36	199	
Riding Horses, and Single Sets of Appointments	Officers	1	1	1	1	1	5	
	Staff Sergeants	1	..	..	..	..	2	
	Sub-Division Non-Commissioned Officers	1	1	1	1	1	6	
	Corporals or Bombardiers	1	1	1	1	1	6	
	Farrier .. ..	..	..	..	..	..	1	
	Smith .. ..	..	..	..	..	..	1	
	Trumpeters	1	..	..	..	..	2	
	Spare	1	1	1	1	..	5	
	Total	6	5	4	4	4	28	

* Includes 1 Gunner to be left at base as Storeman.

WAR ESTABLISHMENT IN ORDER OF SUB-DIVISIONS—continued.

	Sub-Divisions.						Total.	Remarks.
	1	2	3	4	5	6		
Draught Horses and Single Sets of Harness	Howitzers	6	6	6	6	6	36	
	Ammunition wagons ..	12	6	12	12	6	54	
	Artillery wagons ..	4	..	..	4	..	12	
	Ammunition and store wagons ..	..	4	..	..	..	8	
	Forge, R.A. ..	..	..	..	..	6	6	
	Store, R.A. ..	..	..	..	4	4	4	
	Spare wheel ..	..	2	2	2	1	9	
	Total ..	22	18	24	18	23	129	
Carriages and Wagons	Howitzer carriages ..	1	1	1	1	1	6	
	Ammunition wagons ..	2	1	2	2	1	9	
	Artillery wagons ..	1	..	1	1	..	3	
	Ammunition and store wagons	..	1	..	..	..	2	
	Forge wagon ..	..	..	..	..	1	1	
	Store wagon ..	..	..	..	..	1	1	
	Total ..	4	3	4	3	4	22	

A R M S.

TABLE 1.

		War.	For use in Peace. General proportions.
<i>Weedon Store Charge.</i>			
Carbines, M.M., Artillery, Mark II.	..	12	\$ 12 per battery.
Pull-throughs	.. .. .	12	1 per carbine.
Reflectors*	.. .. .	1	1 per battery.
Pistols, Webley	.. .. .	74	18 (25 per cent. of War Est.).
" " rod cleaning	.. .. .	74	
Sword-bayonets, M.II. Carbine	.. .. .	90	1 per collarmaker, wheeler and gunner.
Scabbards { sword-bayonets, M.H.			
Carbine .. .. .	.. .. .	90	1 per sword bayonet.
sword, Cavalry .. .. .	.. .. .	89	1 per cavalry sword.
Swords, cavalry	.. .. .	39†	All N.C. Officers, trumpeters, shoeing smiths, and acting bombardiers.

*For examining interior of barrels.

† Including 9 Acting Bombardiers.

§ When necessary the Rods, clearing in Station Equipment, may be used under proper supervision, and returned to Store immediately after using.

A M M U N I T I O N .

TABLE 2.

		War.	For use in peace.	
			Per 4 howitzer battery.	Remarks.
<i>Gun.</i>				
Rounds per howitzer§	cartridges, 11 $\frac{7}{16}$ ozs., cordite, size 5 ..	66*	129	
	practice†			
	saluting		50	
	common shell	42	81	
	shrapnel	20	38	
	case shot	4	10	
<i>Small Arms.</i>				
Cartridges, Small Arms	ball, 303-in. { service	240	—	20 rounds per carbine.
	{ practice			
	ball, pistol, Webley ..	898	—	
	blank, 303-inch			
Cartridges, aiming tube, Morris, S.A.† .. .. .	.. .. .	—	1000	

* 3 Ammunition wagons and limber, carrying 135 rounds, are issued per battery in addition.

† The annual allowance of ammunition for practice is:—Common shell, 95; Shrapnel shell, 25; Fuzes, D.A. No. 3, Mark II., 95, and T. and P. middle, No. 54, Mark II., 25; Tubes, friction, T., 140. (54/Arty./3833.)

‡ Except Batteries at Woolwich.

§ For "War," the proportions are per howitzer, and for "Peace," per battery.

ACCOUTREMENTS.

TABLE 3.

	War.	For use in Peace. General proportions.
<i>Woolwich Store Charge, No. 1.</i>		
Belts, { Cavalry, patt. '85, O.R.	39	1 per Cavalry sword.
waist, { Field Artillery, dismounted and		
buff { drivers	164	Gunners, collarmakers, wheelers and drivers.
Bottles, water, enamelled†	194	All ranks.
Cases, pistol	74	18 (25 % of War Est.).
Frogs, buff, bayonet, G.S.	90	1 per sword bayonet.
Handcuffs, common pairs	2	2 per Battery.
Knots, sword, buff, Cavalry, line, O.R.	39	1 per Cavalry sword.
Lanyards, pistol	74	18 (25 % of War Est.).
Pouches, { black-japanned, Artillery	12	1 per carbine.
ammunition { pistol	74	
Straps, buff, water bottle † { mounted services	113*	1 per mounted man.
{ dismounted	90	1 per dismounted man.

† Italian water-bottles and brown leather carriages will continue in use until stock is exhausted.

* 9 mounted straps are allowed for Acting Bombardiers.—If any Gunners act as such, their dismounted straps are spare.

ARTICLES FOR REPAIR OF ACCOUTREMENTS.

TABLE 4.

TABLE 4.	Per battery.		
	3 months supply War.‡	Annual supply, Peace.	
		4 howr. battery.	
<i>Woolwich Store Charge, No. 1.</i>			
Billets, buff, waist-belt, cavalry line, all ranks, without buckles	1	1	
Buckles, { frog	1	1	
brass { waist-belt { Cavalry { line ..	†	†	
{ Field Artillery { patt. '85 ..	†	†	
Buttons, brass	1	1	
Chapes, waist-belt, Cavalry, patt.'85* ..	†	†	
Hooks, brass, side, Cavalry, line ..	1	1	
Loops, brass, waist-belt, Cavalry, patt. '85	†	†	
Pieces, { 5½ in. × ¾ in. (for Field Artil- lery waist-belt)	2	2	
leather, { 4½ in. × ¾ in. (for waist-belt, buff { safe, patt. '85)*	†	†	
{ 3 in. × ½ in. (for sword knots)	1	1	
Safes, waist-belt, buff { Artillery ..	2	2	
{ Cavalry* ..	†	†	
Shortparts, waist-belt, Cavalry* ..	†	†	
Straps, buff, frog, Artillery* ..	1	1	

* For patt. '85 waist-belt.

† 3 per cent. brass articles, and 5 per cent. leather.

‡ Carried in the R.A. Store wagon.

MUSICAL INSTRUMENTS.

TABLE 5.		Per battery.	
		War.	For use in Peace.
<i>Woolwich Store Charge, No. 29.</i>			
54	Bugles	2	} 1 per Trumpeter.
Arty.	Trumpets	2	
3341	Strings, bugle, Royal	4	1 per bugle, and 1 per trumpet.

SADDLERY AND POLE DRAUGHT HARNESS.

Number of Sets.

TABLE 6.		Per battery.		Remarks.
		War.	For use in Peace. Lower Establish- ment battery.	
<i>Saddlery, sets.</i>				
Officers, Public		5	5	
Universal		23	15	
<i>Harness.</i>				
Sets, R.A., { lead		76	20	
single { wheel		53	18*	

* Include 6 spare.

5" B.L. HOWITZER EQUIPMENT.

TABLE 7.				War. Per Battery.	For use in Peace. Per Set of Saddlery.	Remarks.
SADDLERY, OFFICERS.						
<i>Woolwich Store Charge, No. 5.</i>						
Bits	{	bridoon, with reins	5	1	{	Until store is exhausted.
		portmouth, with bridle head ..	5	1		
		" reversible heads, bridle*	5	1		
		" reversible*	5	1		
Breastplates ..		.. .. .	5	1	{	Only issued with bit portmouth with bridle head.
Cases, horseshoe	{	near	5	1		
		off	5	1		
Chains, curb ..		.. .. .	5	1		
Collars, head ..		.. .. .	5	1		
Girths, web ..		.. .. .	10	2		
Leathers, stirrup		.. .. .	10	2		
Pannels ..		.. .. . pairs	—	1†		
Reins, portmouth bit		.. .. .	5	1		
Rope, head, cotton ..		.. .. .	—	1		
Saddles ..		.. .. .	5	1		
Skins, lamb, R.A. ..		.. .. .	—	1		
Straps	{	cloak { and wallet	10	2	{	When store of Mark I. O.P. used up.
		centre	5	1		
		girth	20	4		
		wallet‡	10	2		
Sarcingles, leather ..		.. .. .	5	1		
Wallets ..		.. .. . pairs	5	1		
HARNESS AND SADDLERY.						
<i>Woolwich Store Charge, No. 6.</i>						
Blankets, saddle ..		.. .. .	5	—		
Irons, stirrup, G.S. ..		.. .. .	10	2		
Numnahs, felt ..		.. .. .	5	1		
Runners, leather, stirrup ..		.. .. .	10	2		

* When store of bits portmouth with bridle heads is exhausted.

† To be replaced by blankets, saddle, when on active service.

‡ For Mark I wallets only.

TABLE 8.
POLE DRAUGHT HARNESS AND SADDLERY.

		TABLE 8.							
		War. Per Battery.				For Use in Peace.			
		Fild.		Spare.*	For single set of harness.			Per set of Universal Saddlery.	Spare. Per Battery.
					Lead.	Wheel.	Off.		
				Near.	Off.	Near.	Off.		
HARNESS AND SADDLERY.									
Woolrich Store Charge, No. 2.									
Ropes, head, cotton...	1	1	1	4
Woolrich Store Charge, No. 5.									
Bits, portmouth, { Mark II	1	1	1	2
reversible { heads bridle	1	1	1	2
Breechings\$	1	1	1	1
Cases, horseshoe, harness	1	1	1	2
Chain, hame, Mark I	1	1	1	2
Collars { head, R.A.	1	1	1	2
neck	1	1	1	2
Couples, trace	1	1	1	4
Cruppers\$	1	1	1	2
Hames\$	1	1	1	2
Hook, cruppers\$	1	1	1	2

* Carried in Artillery wagons.
 § Special to Pole Draught Harness, R.A.

POLE DRAUGHT HARNESS AND SADDLERY—continued.

	For Use in Peace.						Spare. Per Battery.
	War. Per Battery.	For single set of harness.				Per set of Universal Saddlery.	
		Lead.		Wheel.			
		Near.	Off.	Near.	Off.		
Leggings, drivers\$	65	2	1	1	1	2	
Pannels, iron-arch saddles, driver's†	—	—	1	1	1	—	
Pad, collar, zinc¶	129	2	1	1	1	1	
Pieces, buckling, 1½-inch	258	2	2	2	2	2	
Reins { bearing, Mark II	65	2	1	1	1	1	
Reins { side	129	4	1	1	1	4	
Rings, { iron, 3-inch§	8	—	1	1	1	—	
Rings, { clip††	129	—	1	1	1	—	
Saddles, iron-arch, driver's	—	—	1	1	1	—	
Skins, sheep, harness	—	—	1	1	1	—	
back††	4	—	1	1	1	—	
breast, breeching§	129	2	1	1	1	2	
collar-pad¶	—	—	1	1	1	—	
Straps { flank	258	4	2	2	2	2	
Straps { hame	129	3	1	1	1	2	
Straps { pole bar § || |	—	2 ^a	1	1	1	2 ^a	
Straps { wither, 1½-inch	129	2	1	1	1	2	
Traces, harness { short	76	2	1	1	1	2	
Traces, harness { wheel	129	2	1	1	1	2	
Wallets, iron-arch saddles, driver's††	129	1	1	1	1	1	
Whips, driver's	65	6	1	1	1	3	
Reins, driving, long††	2	—	—	—	—	—	
Whips, driving††	2	—	—	—	—	—	

Woodwick Store Charge, No. 6.

Bits	{	bridoon	152	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
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† Until store is exhausted, and then bits portmouth reversible, and bits portmouth reversible heads bridle, will be issued.

* Carried in Artillery wagons.

†† Provided in order that the A. and S. Wagons may be driven from the box if required.

‡ To be replaced by blankets when stock of panels is used up.

†† Wallets, harness, Mark III, when store is exhausted.

α α Two for each collar-pad.

§ Special to Pole Draught Harness, R.A.

α α Two per team for use as required.

□ □ Two to each vehicle fitted with pole, for pole-bar.

α Per section.

POLE DRAUGHT HARNESS AND SADDLERY—continued.

	For Use in Peace.						Spare. per Battery.	
	War. Per Battery.		Per single set of harness.					
	Field.	Spare.*	Lead.		Wheel.			
			Near.	Off.	Near.	Off.		
HARNESS AND SADDLERY—continued.								
Woolwich Store Charge, No. 6—continued.								
Blankets, saddle	..	152	3	1††	1††	1††	1††	2
Breastpieces	..	19	—	—	—	—	1§	—
Breastplates 	4	—	—	—	—	1||	—
Protector cape	..	23	—	—	—	—	1	—
Cases, horse-shoe, saddlery	..	46	—	—	—	—	2	—
Cruppers, saddlery <i>a</i>	..	23	—	—	—	—	—	—
Frogs, sword, saddle	..	152	2	1	1	1	1	2
Girths, leather, pattern 1884	..	175	6	2	2	2	2	4
Irons, stirrup, G.S.†	..	176	6	2	2	2	2	4
Leathers, stirrup†	..	132	—	1	1	1	1	—
Numnahs, felt	..	23	—	—	—	—	1**	—
Pannels { iron-arch saddles, universal	..	—	—	—	—	—	—	—
{ numnah††	..	—	—	—	—	—	—	—
Reins, bridoon	..	—	—	—	—	—	1	—
Runners, stirrup leather	..	176	6	2	2	2	2	4
Saddles, iron-arch, universal, angle§§	..	23	—	—	—	—	1	—
Skins, sheep, saddlery, hind	..	—	—	—	—	—	1	—
{ baggage	..	264	—	—	—	—	3	—
{ and wallet	..	304	2	2	2	2	2	2
{ cloak { centre	..	88	—	1	1	1	1	—
Straps, { shoe case, pattern 1884	..	46	—	—	—	—	2	1
{ supporting§ { front	..	38	—	—	—	—	2	—
{ rear	..	19	—	—	—	—	2	—
{ trace	..	38	—	—	—	—	2§	—

STABLE NECESSARIES AND EQUITATION ARTICLES.

TABLE 9.

	War.		For use in Peace.	
	Field.	Spare.	Per Battery.	General Proportions.
<i>Woolwich Store Charge, No. 5.</i>				
HARNESS AND SADDLERY.				
Bags { corn, 2-bushel	93	—	—	1 per riding horse and 1 per pair of draught horses, and 4 per spare battery.
{ nose, G.S.	157	8	—	1 per horse, and 4 spare per battery.
Bridles { mouthing { bits	—	—	—	2 per battery.
{ heads, rein	—	—	—	2 " "
{ reins	—	—	—	2 " "
Brushes { snaffle	—	—	—	Batteries of 4 guns.
{ harness, hard	65	—	—	1 per double set of harness.
Cavisons	157	—	—	1 per horse annually.
Combs, curry	—	—	—	1 per battery.
Crosstrees	157	—	—	1 per horse annually.
Pickers, hoof	—	—	—	1 per battery.
Rollers, breaking	113	—	—	Drivers and ranks armed with cavalry swords.
Sacks, corn, 4-bushel*	—	—	—	1 per battery.
Scissors, trimming	33	—	—	1 per 4 draught horses.
Sponges, G.S.	93	—	—	1 per riding horse every 5 years, and 1 per pair of draught horses every 3 years.
Straps, kicking†	286	—	—	1 per riding horse, and 2 per draught horse annually.
Whips { hand	—	—	—	1 per battery.
{ longeing	—	—	—	4 per battery.
{	—	—	—	2 " "

* For "peace," strapped on ammunition boxes, gun carriage, and limber.

† For "war," carried in artillery wagons. Special to Pole Draught.

+ The 5-bushel sacks now in possession should be continued in use for home service until stock is exhausted.

POLE DRAUGHT.

MATERIALS FOR REPAIR OF POLE DRAUGHT HARNESS AND SADDLERY.
Per Battery.

TABLE 10.

TABLE 10.	War. 3 Months' Supply.	Peace. 12 Months' Supply.
		Lower Estab- lishment battery.
<i>Woolwich Store Charge, No. 2.</i>		
Buckets, water, G.S. :—		
Burrs †	6	8
Rivets ‡	6	8
<i>Woolwich Store Charge, No. 5.</i>		
HARNESS AND SADDLERY.		
Protector cloak	1	2
Pans, oil .. .. .	..	2
Saddletrees { flaps, harness, drivers pairs	1	2
{ seats, iron-arch, drivers "	1	2
Traces, chains, wheel	1	2
<i>Woolwich Store Charge, No. 6.</i>		
Basils, brown { strained	1	1
{ unstrained	6	20
Blankets, old, pieces of lbs.	9	2
Bosses { bit	3	5
{ breastplate	1	2
{ head collar, officers	1	1
{ 1½-inch	1	1
{ 1 "	1	1
{ 1 "	1	1
{ 1 "	5	6
{ 1 "	1	1
{ 1 "	2	7
{ double .. 1½ " head collar ..	3	3
{ barred .. 1½ " curved ..	2	5
{ double { 1 "	3	6
{ 1 "	3	9
{ 2½ " { bow leg ..	1	4
{ 2 " { straight leg ..	1	4
{ 1½ "	2	3
{ 1 " .. barred for girth ..	6	10
{ 1 "	4	7
{ 1 "	5	10
{ 1 "	3	4
{ iron, roller { 1 " .. .. .	..	1
{ 1 " .. .. .	..	1
{ iron, tinned { inlet, 1½-inch	3	3
{ roller, 1½-inch, V-girth attachment ..	2	3
{ iron, barred, double-roller, ½-inch† ..	2	4
Burrs, copper	2	20
Cord { cotton (for loops of drivers whips) .. yds.	7	9
{ whip lbs. ozs.	1.8	2.4
Dees, iron, tinned, 2½-inch	1	1
Eyelets, nosebag	5	6
Facings, lambskin, R.A. sets	..	1

* See para. 366, Part 1., Equipment Regulations.

† For new pattern bearing rein.

‡ For trace bearers.

MATERIALS FOR REPAIR OF POLE DRAUGHT HARNESS AND
SADDLERY—continued.

TABLE 10—continued.		War. 3 Months' Supply.	Peace. 12 Months' Supply.	Lower Estab- lishment Battery.
<i>Woolwich Store Charge, No. 6—continued.</i>				
Felt { brown, 48 inches wide inches	..	15		
" cuttings¶ lbs.	5	6		
Hair, horse, saddlery† .. ..	..	..	1	
{ backs { bridle	1	3 1/4	54	
collar	1	1 1/4	Gen. No.	
heavy	1	1 1/4	5415	
Hides { brown { cloak .. ..	..	1		
" light .. ..	..	1		
" shoulders .. ..	..	1		
horse§ .. ..	..	2 3/4		
Links, iron, 1 1/4-inch** .. ..	..	2		
Linen, brown yds.	..	1 1/2		
Rings { brass { 1 1/4-inch	1	1		
" 1 1/4 "	1	1		
iron { 1 1/4 " { slight	2	4		
" stout	2	2		
" 1 "	2	3		
Saddletrees { flaps, universal pairs	1	1		
seats, universal|| .. ..	1	2		
Serge, collar-makers* .. ..	..	..
Skins { lamb for repairs .. ..	..	1		
sheep " " .. ..	..	1 1/2		
Squares { brass	1	1		
iron	3	6		
Strips, leather, for pipes, trace, wheel	4	8		
Studs { brass, for breastplates, patt. '84	3	2	54	
frog, sword, saddle	1	2	Gen. No.	
Walleys	7	14	5415	
Thread { black, 3-cord lbs. ozs.	..	0 12 1/2	54	
flax, fine	2 1	5 0	6 Dns.	
whited-brown	0 6	0 12 1/2	628	
Twine, quilting†† ozs.	0 8 5/8	0 8 5/8		
Web { diaper, 2-inch yds.	..	6		
straining‡‡	2	3 1/4		
worsted, blue, 3 1/4-inch	1 1/4	6		
<i>Woolwich Store Charge, No. 8.</i>				
Wire { copper, No. 7 W.G., hard lbs. ozs.	0 0 1/2	0 5		
" 1 " " "	0 2 1/2	0 15		
" 4 " " "	0 2 1/2	1 9		
" 5 " soft	0 2 1/2	5 0		

* Hair pannels only, 2 1/4 yards for each 25 saddles.

† Only when hair pannels are used, at the rate of 7 lbs. per 25 pairs.

‡ Pieces of new or part worn leather may be issued in lieu of hides, weight for weight. § Repair of whips. || According to pattern of saddle in use.

¶ When cuttings are not available, felt in the piece will be issued in the proportion of 1 yard of felt to 5 lbs. cuttings. ** For trace bearers.

†† Only when pannels are used, at the rate of 1/2 oz. per pair of hair pannels in possession. ‡‡ 4 yards additional allowed for each 25 steel arch saddles with web support to seat in possession.

§§ For re-whipping ends of head-ropes.

MATERIALS FOR REPAIR OF POLE DRAUGHT HARNESS AND
SADDLERY—continued.

TABLE 10—continued.

		War. 3 Months' Supply.	Peace. 12 Months' Supply.
<i>Woolwich Store Charge, No. 9.</i>			
Spelter, brass	lbs. ozs.	0 5	0 3
<i>Woolwich Store Charge, No. 10.</i>			
Nails, steel, cut tack, No. 197	lbs. ozs.	1 0	1 6
Screws, iron, flathead { $\frac{3}{4}$ -inch, gauge No. 9 .. ..	..	35	20
{ $\frac{1}{2}$ " " " " 10 .. ..	..	3	5
<i>Woolwich Store Charge, No. 11.</i>			
Borax, refined	lbs. ozs.	0 1	0 1
Dubbing*	lbs.	..	29 11
Flour	lbs. ozs.	0 4	0 8
Ink, marking .. .. .	.. pints	..	11
.. .. .	.. lbs.	..	30
Linen, old { for cleaning* .. .. .	..	..	..
{ " repair of corn bags .. .. .	..	..	..
and nosebags }	lbs. ozs.	2 4	3 12
Oil, rape* .. .. .	.. quarts	..	58
Soap { soft* .. .. .	.. lbs.	..	348
{ yellow, hard§ .. .. .	.. bars	..	146
Wax { bees	lbs. ozs.	0 5	0 8
{ black	" "	1 8	2 3
<i>Woolwich Store Charge, No. 18.</i>			
Canvas, sail, No. 3 (for repair of nosebags)	yds.	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Cordage, bolt, white, 3-inch .. .. .	.. fms.	4	5 $\frac{1}{2}$
Twine, packing, small	lbs. ozs.	0 12	1 2
<i>Woolwich Store Charge, No. 20.</i>			
Rivets, fire bucket, $\frac{1}{2}$ -inch, with burrs† .. ..	..	..	..

* In addition the following is allowed annually for Station Equipment, viz.:—

		6-gun batteries.	Lower Estab- lishment Battery.
		War.	
54 Cavalry Gen. No. 896	Linen, old, for cleaning	5 $\frac{1}{2}$	8 $\frac{1}{2}$
	Naphthaline	4	4
	Oil, rape	6 $\frac{1}{2}$	9 $\frac{1}{2}$
	Soap, soft	25	36
57 Gen. No. 6521	Dubbing	1 $\frac{1}{2}$	3 $\frac{1}{2}$

† 3 per 10 saddles, iron-arch, drivers, and luggage. For attaching side rein buckle to saddle tree.

†† In addition to this quantity, 1 lb. per gun, or 1 $\frac{1}{2}$ lbs. per gun and wagon, is allowed for straps and leather work.

§ A bar weighs about 19 ozs.

MATERIALS FOR REPAIR OF OFFICERS' SADDLETREES.*

TABLE 11.		War 3 Months' Supply.	Peace. 12 Months' Supply.	Remarks.
<i>Woolwich Store Charge, No. 6.</i>				
HARNESS AND SADDLERY.				
Saddletrees	Burrs, brass	1	8	
	Cantles	1	1	
	{ crupper, brass	1	1	
	{ front, brass	1	1	
	Plates { " steel, inside	1	1	
	{ top, brass	1	1	
	{ gullet, steel	1	1	
	Rivets, copper { long	1	7	
	{ short	1	10	
	Screws, brass, fine doz.	$\frac{1}{2}$	1	
	{ crupper, brass	1	1	
	Staples { front, brass	1	1	
	{ wallet, N.P.	1	3	
	{ girth	1	1	
	Washers	1	1	
	Dec, with brass-plated chape.. ..	1	1	
<i>Woolwich Store Charge No. 8.</i>				
Wire, iron, soft, No. 7 W.G. .. ozs.		4	4	
<i>Woolwich Store Charge No. 10.</i>				
Screws, brass, $\frac{1}{2}$ -inch, gauge No. 13 ..		1	2	
Glue lbs.		$\frac{1}{4}$	$\frac{1}{2}$	

* See para. 366, Part I, Equipment Regulations.

MATERIALS, REPAIRING SADDLETREES OF HARNESS AND UNIVERSAL
SADDLERY.*

TABLE 12.		War. 3 Months' Supply per Battery.		Peace. Per Battery—12 Months' Supply.	
		Saddlery.	Harness.	Saddlery.	Harness.
<i>Woolwich Store Charge, No. 6.</i>					
HARNESS AND SADDLERY.					
Saddletrees	Arches, { drivers { front	2	..	2	..
	iron { hind	2	..	2	..
	or steel { universal { front	1	..	1	..
	{ hind	1	..	1	..
	Bars, side, { drivers { near	2	..	2	..
	shaped { off	2	..	2	..
	{ universal { near	1	..	3	..
	{ off	1	..	1	..
	Dees or links	1	6	5	4
	Plates { for dees or links, universal	1	..	5	..
	{ with dees or squares, drivers	6	..	6	..
	„ stirrup link † .. ..	..	..	..	..
	„ buckle and crupper link § .. ..	..	..	..	..
	Rivets, iron, 2-inch	11	2	25	20
	Staples { cloak and { drivers	2	..	5	..
	{ wallet { universal || N.P. }	2	..	5	..
	{ flank, drivers	4	..	5	..
	{ girth	2	..	2	..
<i>Woolwich Store Charge, No. 8.</i>					
Paper, glass middling sheets		1	..	1	..
Pencils, carpenters .. ..		..	..	1	..
Wire, iron, soft, No. 7 W.G. (for rivets) ozs.		1	..	3	4
<i>Woolwich Store Charge, No. 11.</i>					
Oil, linseed, raw pints		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Paint, prepared, black, lamp lbs. ozs.		0 8	..	0 4	0 6
Varnish, shellac, orange		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

* See para. 366, Part I., Equipment Regulations.

† Steel arch saddle side bars are suitable for all universal saddles, but iron arch saddle side bars are only suitable for the angle iron arch saddle.

‡ 8 per cent. saddles so fitted.

§ 1 per cent. saddles steel arch.

|| Pattern 1884—20 per cent. saddles so fitted.

MATERIALS FOR REPAIR AND PRESERVATION OF EQUITATION ARTICLES.

TABLE 13.	For use in Peace. Per Battery.	Remarks.	
	Field.		
<i>Woolwich Store Charge, No. 5.</i>			
Sponges, G.S. 	1	} Annual supply.	
<i>Woolwich Store Charge, No. 6.</i>			
Cord, whip 	6		
<i>Woolwich Store Charge, No. 11.</i>			
Linen, old (rags) lbs.	$\frac{1}{4}$		
Oil, rape pints	1		
Soap, soft* lbs.	5		

* $\frac{1}{8}$ bar of yellow soap may be drawn in lieu of every $\frac{1}{4}$ lb. soft, if preferred.

N.B.—No other materials than those given in this Table are considered necessary, the materials supplied for repairing the harness and saddlery generally being sufficient for casual repairs to the equitation articles also.

CARRIAGES—continued.

Table 14—continued.	War.						For use in Peace.				
	Gun Carriage and Limber.		Wagons.				Total per Battery.	Gun Carriage and Limber.	Wagons.		Total.
	Ammunition and Limber.	Artillery.	Forge, R.A., and Limber.	Store, R.A., and Limber.	Ammunition and Store, R.A.			Ammunition and Limber.	Ammunition and Store, R.A.	Lower Establishment Battery (4 Howitzers)	
<i>Woolwich Store Charge, No. 13.—continued.</i>											
<i>Fittings (spare)—continued.</i>											
Keys, capsquare { No. 18 left ..	..	..	..	..	..	..	1	..	..	..	1+
Nuts, bolt, spring with check nut, and split key ..	..	..	..	..	..	..	1	..	..	..	1+
Plates, dividing springs ..	..	..	..	..	..	..	2	..	..	..	..
Plugs, filling hole, No. 2 ..	..	..	..	..	..	..	2	..	..	..	2+
Pipe, connecting buffer, with fittings ..	..	..	..	..	..	..	1	..	..	..	..
Springs, spiral ..	..	..	..	..	..	..	6	..	..	..	2+
<i>Special implements.</i>											
Spanners, hydraulic buffer { No. 77* ..	1	..	..	..	..	..	6	1	..	..	4
ammunition and store, R.A. { " 79* ..	1	..	..	..	..	..	6	1	..	..	4
Covers, wagons { artillery ..	..	..	1	..	..	..	2	..	..	1	1
forge, R.A. { ..	..	..	..	..	..	..	3	..	..	..	..
store, R.A. { ..	..	..	..	..	..	..	1	..	..	..	..
	..	..	..	..	..	..	1	..	..	..	..

[illegible]

* These are issued with the various vehicles, &c., and are only demanded separately to replace damaged articles.
 † Carried as convenient.
 ‡ Carried in the Artillery wagon.
 § Carried in the stock of these is used up, "Swingletree, No. 10" will be issued.
 §§ When the stock of these is used up, "Swingletree, No. 10" will be issued.

* These are issued with the various vehicles, &c., and are only demanded separately to replace damaged articles.
 † Carried as convenient.
 ‡ Carried in the Artillery wagon.
 § Carried in the stock of these is used up, "Swingletree, No. 10" will be issued.
 §§ When the stock of these is used up, "Swingletree, No. 10" will be issued.

TOOLS FOR PAINTING CARRIAGES, &c.
(Triennial supply, during Peace only.)

Table 15.	Per battery.	Remarks.
<i>Woolwich Store Charge, No. 5.</i>		
Pans, oil	6	
<i>Woolwich Store Charge, No. 7.</i>		
Brushes, sable, writing, duck, large ..	2	
Cans, paint { 7½ inches diameter ..	1	
7 " " " ..	1	
<i>Woolwich Store Charge, No. 8.</i>		
Knives { palette, 9-inch	1	
putty	1	
<i>Woolwich Store Charge, No. 25.</i>		
Brushes, paint { ground 000	1	
{ No. 2	2	
{ sash tool { " 4	1	
" 6	1	

When a battery is placed on a War footing, the tools in possession may be retained until used up, but they will not be maintained in the field.

MATERIALS FOR PAINTING CARRIAGES, &c.
(Annual supply during Peace only.)

Table 16.	Paint Prepared — Lead Colour.		Putty.		
	lb.	oz.	lb.	oz.	
<i>Woolwich Store Charge, No. 13.</i>					
Carriages, field, B.L., 5-inch, howitzer ..	6	..	..	8	½ gill of raw linseed oil for side arms to each carriage.
Limbers, field, B.L., { carriage	5	12	..	8	
5-inch, howitzer { wagon	5	12	..	8	
Poles, draught .. .. .	..	5	..	1	
Wagons { ammunition and store, R.A.	16	..	2	..	
B.L., 5-inch, howitzer	6	..	..	8	
forge, R.A., (with limber) Mark III..	14	..	1	12	
store, R.A. (with limbers)	14	..	1	8	
Artillery.. .. .	15	..	2	..	
Wheels, 2nd class { "B" No. 28	1	..	..	1	
{ "C" { No. 36	1	8	..	2	
" 37	1	..	..	1	
" 41	1	8	..	2	

TIME AND WORKING PAY ALLOWED FOR SCRAPING, CLEANING,
AND PAINTING CARRIAGES, &C.

Table 17.		Scraping and Cleaning.		Painting.			
				Priming, or first coat.		Stopping and second coat.	
		Time.	Amount.	Time.	Amount.	Time.	Amount.
<i>Woolwich Store Charge, No. 13.</i>		H. M.	s. d.	H. M.	s. d.	H. M.	s. d.
Carriage, field, B.L., 5-inch, howitzer		7 30	0 7½	5 0	0 7½	6 30	0 9½
Limbers, field, B.L. { carriage ..		7 30	0 7½	5 0	0 7½	6 30	0 9½
5-inch, howitzer { wagon ..		7 30	0 7½	5 0	0 7½	6 30	0 9½
Poles, draught		0 15	0 0½	0 10	0 0½	0 15	0 0½
Wagons	ammunition and store, R.A. ..	13 0	1 1	13 0	1 7½	17 0	2 1½
	" B.L., 5-inch, howitzer	7 30	0 7½	5 0	0 7½	6 30	0 9½
	forge, R.A., (with limbers)	15 0	1 3	13 0	1 7½	17 0	2 1½
	Mark III	15 0	1 3	12 30	1 6½	17 0	2 1½
	store, R.A. (with limber) ..	13 0	1 1	13 0	1 7½	17 0	2 1½
	Artillery	13 0	1 1	13 0	1 7½	17 0	2 1½
Wheels, 2nd class { "B" No. 28 ..		0 25	0 0½	0 40	0 1	0 45	0 1½
{ "C" No. 36 ..		0 40	0 0½	0 50	0 1½	1 0	0 1½
{ " " 37 ..		0 25	0 0½	0 40	0 1	0 45	0 1½
{ " " 41 ..		0 40	0 0½	0 50	0 1½	1 0	0 1½

MATERIALS FOR PAINTING, AND TIME AND WORKING PAY ALLOWED
FOR CLEANING AND PAINTING ORDNANCE.

Table 18.		Magnetic oxide, each coat.	Lacquer for bore, each coat.	Cleaning exterior and interior.		Painting exterior and interior, one coat.	
				Time.	Amount.	Time.	Amount.
		lb. oz.	oz.	H. M.	s. d.	H. M.	s. d.
Ordnance, B.L., 5-inch, howitzer		0 12	4	3 0	0 3	0 30	0 0½

[illegible]

Kettles, camp, oval, 12 qts. . .	1	3	2	2	2	2	47	1	3	2	9	1 per 8 N.C.O.'s and men.
Lanterns, tent, folding . . .	..	..	..	2	2	..	4	..	..	2	2	Same as for Field Service.
Mallets, heel, peg . . .	..	..	4	..	..	..	12	..	..	..	2	1 pair per horse.
Mauls, G.S. . .	..	1	..	1	1	..	16	..	1	..	2	{ 1 per horse at home stations only (when required).
Nets { forage . . .	..	..	..	..	..	..	157	..	..	..	..	1 per horse, public property.
hay . . .	..	..	..	..	..	..	..	..	..	..	..	Same as for Field Service.
Pads, surcingle . . .	..	..	..	..	..	..	..	..	..	..	..	Do.
Panniers, grocery . . .	..	..	1	..	..	..	157	..	..	..	6	1 per sub-division and 1 per guard tent.
Pegs, picketing, with loop . . .	..	..	..	..	..	..	3	..	..	..	6	Same as for Field Service.
Posts, picket, 2½ ft. . .	..	6	4	12	12	4	165†	..	6	2	3	Do.
Racks, arm, tent . . .	..	..	..	..	..	7	98	..	..	..	3	1 per sub-division and 1 per guard tent.
Ropes { head, cotton . . .	..	..	..	..	..	..	7||	..	..	..	6	Same as for Field Service.
heel . . .	..	..	..	..	..	..	165†	..	..	..	6	Do.
picketing, 80 ft. (c) . . .	..	..	..	..	..	..	157	..	..	..	..	1 per sub-division and 1 per guard tent.
Sheets, field, cavalry . . .	..	..	3	2	2	1	15	..	..	..	..	Same as for Field Service.
Shovels, universal . . .	..	..	..	..	..	..	194	..	..	..	..	1 to 15 horses.
Spades, N.P. . .	..	..	1	..	..	..	5	..	..	1	1	Same as for Field Service.
Stools, camp, folding . . .	2	2	1	2	2	1	39	2	2	1	11	{ 1 per 8 N.C.O.'s and men; remainder as for Field Service.
Tents, complete, circular, single (d) . . .	..	..	..	..	..	..	1	..	..	..	..
Wedges, sawyer's { 10-in. . .	..	..	..	1	..	..	20||	..	..	..	2	
7-in. . .	..	..	..	2	..	..	2	..	..	..	..
Stretchers, ambulance . . .	..	1	..	..	..	..	1	..	..	..	..

Woolwich Store Charge, No. 3.

* 5 per 100 horses. † These are for protection of harness and saddlery in camp, and will be demanded as required. § Carried in the ammunition wagon. (b) These are for drill purposes, but the full proportions will be allowed when in camp. They will be carried as convenient. (c) Spare mallets, pins, and poles are provided in the proportion of 5% upon the number issued. (d) Spare mallets, pins, and poles are provided in the proportion of 5% upon the number issued.

CAMP EQUIPMENT—continued.

TABLE 19—continued.		Field Service.						For use in Peace.			Standing Camps.		
		Wagons.						Gun Carriage and Limber.	Wagons.		Total. — Lower Estab- lishment Battery (4 Ho- witzers.	General Proportions.	
		Gun Carriage and Limber.	Ammunition and Limber.	Artillery.	Force, R. A., and Limber.	Store, R. A., and Limber.	Ammunition and Limber.		Store, R. A. and Ammunition	Ammunition and Limber.			
Woolwich Store Charge, No. 13.													
Straps, securing, 1" x 4½" (camp kettle lids) (c)	1	3	2	2	2	2	47	1	3	2	9	Same as for Field Service.
Woolwich Store Charge, No. 26.													
Stones, rub, scythe	1	..	1	..	..	..	..	Same as for Field Service.
Woolwich Store Charge, No. 27.													
Blankets, G.S.	2	4	46*	2*	2*	2*	19½	2	4	..	12	2 per N.C.O. and men.

(c) These are issued with the limbers and wagon, and are only demanded separately to replace damaged articles.
* For service abroad only.

IMPLEMENTS, BUTCHERY.*

TABLE 20.	War.		For use in Peace.	Remarks.
	Artillery Wagon.	Total per Battery.	Total. — Lower Estab-lishment Battery (4 Howitzers)	
<i>Woolwich Store Charge, No. 26.</i>				
Implements, butcher's—				
Balances, spring, 4-lb... ..	1	1	1	
Cases, wood	1	1	1	
Choppers, meat	1	1	1	
Hooks, butchers', dressing, 9-inch†	6	6	6	
Knives, { cutting	1	1	1	
butcher's { flaying, large ..	1	1	1	
Saws, tenon, 14-inch	1	1	1	
Sheets, ground (unservicable)†	1	1	1	
Steels, butchers'	1	1	1	
Steel-yards, 56-lb.	1	1	1	

* Implements for use in camp during peace to be demanded separately.
(*Vide* paras. 218 *et seq.*, Part I, Equipment Regulations, 1895.)

† Hooks, butchers', S., flat plain, 6-inch, will continue in use until worn out.

† To place the cut-up meat upon. A chopping block, if required, must be improvised.

ORDNANCE AND GENERAL STORES.

TABLE 21.	War.						For use in Peace.			Remarks to Peace Equipments only.		
	Wagons.						Wagons.		Total. Lower Estab- lishment Battery (4 Howitzers)			
	Gun Carriage and Limber.	Ammunition and Limber.	Artillery.	Forge, R.A., and Limber.	Store, R.A., and Limber.	Ammunition and Store, R.A.	Ammunition and Limber.	Ammunition and Store, R.A.				
<i>Woolwich Store Charge, No. 5.</i>	1	2	1	1	1	1	22	1	2	1	6	} Carried as convenient.
Brushes, water, carriage	44	..	..	..	12	
Couples, trace	
<i>Woolwich Store Charge, No. 7.</i>	9	1	} Carried as convenient.
Cases, saw, hand	1	
Chest, tool, filled { No. 3F (a) .. " 5A .. " 10 (a)	2	
Cutters, wire	1	} Carried as convenient.
Drivers, screw, G.S., 6-inch	1	
Grindstones, F.S., 10-inch	1	
Hammers { claw, 20-oz. .. smith's, sledge, 10-lb.	6	4	} Carried as convenient.
<i>Woolwich Store Charge, No. 8.</i>	2	..	..	..	1	
Knives, clasp	9	..	..	..	1	
Level, spirit, block, 6-inch*	1	} Carried as convenient.
	
	

[illegible]

* Except batteries at Woolwich.

§ Includes Station Equipment.

(a) When a battery is placed on a War Establishment, the Smith's and Wheeler's tools are carried in special chests, forming part of the Forge Wagon, and the ordinary chests returned to store.

(c) Tinman's tools consist of:—1 groover; 1 iron, soldering; 1 mallet, tinman's; 1 shears, tinman's; scotch, and a small allowance of solder; and these together with a piece of canvas cloth will be carried in a canvas bag.

(b) A proportion of this may be used for occasionally lubricating the fuzze hole plugs, to prevent them becoming set fast and ingress of damp.

ORDNANCE AND GENERAL STORES—continued.

	War.						For use in Peace.			Remarks to Peace Equipments only.
	Wagons.						Wagons.		Total.	
Gun Carriage and Limber.	Ammunition and Limber.	Artillery.	Forge, R.A., and Limber.	Store, R.A., and Limber.	Ammunition and Store, R.A.	Total per Battery.	Gun Carriage and Limber.			Annual supply. Carried as convenient.
							Ammunition and Limber.	Ammunition and Limber.	Ammunition and Store, R.A.	
<i>Woolwich Store Charge, No. 11—continued.</i>										
Oil (a) { olive, best quality, lubricating, pints Rangoon rape Sacks, coal, with buckets, tarred, empty Soap (a) { soft lb. yellow bars Tallow, Russian (b)	1 1/2	..	12	16*	..	12	..	..	12	Annual supply. Carried as convenient.
	12	..	..	37	..	..	33 1/2	
	68	..	..	68	..	..	.. 1	
	1	..	..	1	..	..	..
	56	..	..	56	..	..	..
<i>Woolwich Store Charge, No. 13.</i>										
Boxes (a) { Stationery, Store, wagon, R.A. dubbing soft soap flour fuze { No. 22 23 grease, 14lb.	1	..	1	..	..	..	Annual supply. Carried as convenient.
	2	..	..	2	..	..	..
	4	..	..	4	..	..	..
	1	..	..	1	..	..	.. 3	
	27	..	..	10	

ORDNANCE AND GENERAL STORES—continued.

TABLE 21—continued.	War.	For use in Peace.						Remarks to Peace Equipments only.			
		Wagons.									
		Gun Carriage and Limber.	Ammunition and Limber.	Forge, R.A., and Limber.	Store, R.A., and Limber.	Ammunition and Store, R.A.	Total per Battery.				
Woolwich Store Charge, No. 13—continued.	1	1	1	1	1	1	1	15	1	1	5
	1	1	1	1	1	1	1	9	1	1	1
	1	1	1	1	1	1	1	15	1	1	5
	1	1	1	1	1	1	1	6	1	1	4
	1	1	1	1	1	1	1	6	1	1	4
	1	1	1	1	1	1	1	12	2	1	8
	1	1	1	1	1	1	1	15	1	1	5
	1	1	1	1	1	1	1	15	1	1	5
	1	1	1	1	1	1	1	9	1	1	1
	1	1	1	1	1	1	1	1	1	1	..
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
Handspikes, traversing, No. 1 ..	1	1	1	1	1	1	1	15	1	1	5
Holdalls, needles and silk twist (a) ..	1	1	1	1	1	1	1	9	1	1	1
Keys, spring, lock (a) ..	1	1	1	1	1	1	1	15	1	1	5
Pocket, key, fuze, universal (a) ..	1	1	1	1	1	1	1	6	1	1	4
" tube, special (a) ..	1	1	1	1	1	1	1	6	1	1	4
" blue disc ..	1	1	1	1	1	1	1	12	2	1	8
Post, aiming { red ..	1	1	1	1	1	1	1	15	1	1	5
Trays (a) { gun fittings { upper ..	1	1	1	1	1	1	1	15	1	1	5
Trays (a) { gun fittings { lower ..	1	1	1	1	1	1	1	15	1	1	5
Tray, gun fittings, R.A. Store Wagon :—	1	1	1	1	1	1	1	9	1	1	1
B.L., 5-inch howitzer ..	1	1	1	1	1	1	1	1	1	1	..
Woolwich Store Charge, No. 14.											
Handspikes, common, 6ft. ..	1	1	1	1	1	1	1	9	1	1	1

ORDNANCE AND GENERAL STORES—continued.

TABLE 21—continued.	War.							For use in Peace.			Remarks to Peace Equipments only.	
	Gun Carriage and Lumber.	Wagons.					Gun Carriage and Lumber.	Wagons.		Total. — Lower Establish- ment Battery (4 Howitzers)		
		Ammunition and Lumber.	Artillery.	Forge, R.A., and Lumber.	Store, R.A., and Lumber.	Ammunition and Store, R.A.		Ammunition and Lumber.	Ammunition and Store, R.A.			
<i>Woolwich Store Charge, No. 20.</i> Cases, powder, metal-lined, Keys Covers, cartridge, canvas, B.L., 5-inch howitzer, 11½ oz. cordite.. Silk twist .. Strap, carrying, projectile, B.L., 5-inch howitzer	..	1	..	..	..	..	9	1	..	1	
	21	45	..	..	..	..	531	45	21	129	
	..	2	..	..	..	..	18	2	..	2	
	1	1	..	..	..	..	15	1	1	5	
<i>Woolwich Store Charge, No. 21.</i> Cartridges, B.L., 5-inch howitzer, 11½ oz., cordite, size 3½ ..	21	45	..	..	..	..	531	45	21	129	
<i>Woolwich Store Charge, No. 22.</i> Fuzes { time and percussion, middle No. 54, Mark II. .. direct-action, No. 3, Mark II.. Implements, fuze } keys, fuze, universal .. shell, and cartridge }	6	14	..	..	..	..	162	14	6	38	
	15	30	..	..	..	..	360	30	15	90	
	3	4	..	..	..	..	54	4	3	16	

Lanyards, friction tube, T	..	..	2	..	..	..	30	2	2	..	..	10
Pockets, tube, L.S.	..	..	..	..	..	..	9	..	1	..	..	4
Straps, tube, box, long	..	..	1	..	..	..	9	..	1	..	..	4
Tubes, friction T*	..	..	60	..	..	..	720	30	60	..	..	180
<i>Woolwich Store Charge, No. 23.</i>												
Cartridges, aiming tube, Morris, S.A. †..	..	..	..	..	..	..	..	..	..	..	..	1000
<i>Woolwich Store Charge, No. 24.</i>												
Shell, B.L., filled {shrapnel	..	..	6	..	..	..	162	6	14	..	..	38
common .. (cast iron)	..	..	13	..	..	..	339	13	29	..	..	81
Shot, case ..	..	..	2	..	..	..	30	2	2	..	..	10
<i>Woolwich Store Charge, No. 25.</i>												
Boards, inventory ..	..	..	..	..	..	1	5	..	..	1	..	1
Boxes, lantern, bull's-eye..	..	..	..	..	..	..	9	..	1	3	..	4
Irons, {figures 0 to 8, ½-inch sets..	..	..	..	..	..	..	1	..	..	1	..	1
branding {letters, ½-inch (alphabet) sets (a)	..	..	..	..	..	..	1	..	..	1	..	1
Lantern, bull's-eye§	..	..	..	..	..	..	9	..	1	3	..	4
Ruler (b)	..	..	..	..	..	..	1	..	..	..	..	..
{copper, {figures, 0 to 8, ½-inch sets	..	..	..	..	..	..	2	..	..	..	..	..
inlaid {letters, ½-in. (alphabet) (a),	..	..	..	..	..	..	..	..	..	..	..	..
{metal {figures, 0 to 8, ½-inch "	..	..	..	..	..	..	2	..	..	..	..	..
{letters, ½-inch (a) "	..	..	..	..	..	..	2	..	..	..	..	..
{wood {figures, 0 to 8, ½-inch "	..	..	..	..	..	..	2	..	..	..	..	..
{letters, ½-inch (a) "	..	..	..	..	..	..	2	..	..	..	..	..
{metal {figures, 0 to 8, ½-inch "	..	..	..	..	..	..	2	..	..	..	..	..
{letters, ½-inch (a) "	..	..	..	..	..	..	2	..	..	..	..	..
Wells, ink (b)	..	..	..	..	..	..	2	..	..	..	..	..

} 3 carried as
convenient.

* Packed in tin boxes, each containing 10.

† Tubes, after firing, are to be returned to Woolwich, to be repaired and refilled; they should be immersed in mineral oil within 24 hours after firing, for which purpose half a gallon of oil, per 100 tubes, of which $\frac{1}{10}$ pint would be used up in the treatment, will be allowed.

‡ Except batteries at Woolwich.

(a) R.A. as required, in addition to the battery letter or numeral.

(b) These are issued with the wagon, and are only demanded separately to replace damaged articles.

§ Oil and wick will be supplied by Army Service Corps, as required.

<i>Woolwich Store Charge, No. 22.</i>												
Fuzes, dummy	(T. and P., middle, No. 5†, Mark II	..	..	..	..	..	..	..	..	..	..	8
	(D.A., No. 3, Mark II	..	..	..	..	..	..	..	..	..	..	8
	section, T. and P., middle, No. 5†,	..	..	..	..	..	..	..	..	..	..	1
	Mark II	..	..	..	..	..	..	..	..	..	..	1
Tubes, friction, T, drill ..	(section D.A., No. 3, Mark II	..	..	..	..	..	..	..	..	..	..	4

<i>Woolwich Store Charge, No. 24.</i>												
Shells, drill, B.L., 5-inch..	..	..	..	..	..	..	..	..	..	..	..	6
												Carried as convenient.

* Supply wagon only.

† 1 per section, spare, in addition—carried in the ammunition wagon limber. $\left(\begin{smallmatrix} 40185 \\ 7889 \end{smallmatrix} \right)$

(5465)	Screws, iron	{ flat head	{ 3 inch, gauge No. 16 2 1/2 " " " 16 2 " " " 14 1 1/2 " " " 13 1 " " " 12 1 " " " 10 1 " " " 13 1 " " " 8 1 1/2 " " " 13	..	..	48 24 24 36 36 36 36 36 24 5 10 4	..	..	General repairs .. ..	..	No. 3 drawers, wheelers' tool chest.
	Screws, looped, No. 3 flat	{ round head	{ 1 1/2 " " " 13 1 1/2 " " " 13	..	..	24 5	..	..	Wagons, ammunition, and store, and Artillery wagons	..	Forge limber.
	Staples	{ lashing, riveting, 1 1/2-inch " with plate single box..	..	..	..	10 4	..	..	..	..	..
	Borax, refined	..	..	..	..	1 8	lb.	oz.	..	..	No. 2 drawer, smiths' tool chest.
	Glue, best town made	..	..	..	..	2 2	..	..	..	..	Forge limber.
	Paint	{ blue, ultramarine (dry) red, Chinese (dry)	..	..	..	2 2	..	..	..	..	Forge limber.
	Resin, black	..	..	..	..	1 1	..	..	..	..	No. 2 drawer, smiths' tool chest.
	Salmoniac, in lumps	..	..	..	..	1 1	..	..	..	..	Forge limber.
	Turpentine, spirits of	..	..	..	..	1 1	pints	..	..	..	No. 3 drawer, wheelers' tool chest.
	Bolts, with nuts	{ hexagon head, 1/2 in. x 1 1/2 in. countersink head, 1/2 in. x 2 in. nare, 2nd Class { No. 41 wheel " " " { No. 42	..	..	..	6 6 2 2	..	..	..	..	No. 3 drawer, wheelers' tool chest.
	Chain, iron, 1 1/2 lb. per yard..	..	..	..	..	14 1	yards	..	..	..	Forge limber.
	Forges, field	{ handles, lever, Mark IV.. cheese-head, 3/8 in. x 1 1/2 in. (set of 8) hexagon head, 1/2 in. x 1 1/2 in. (set of 9)	..	..	..	1 1	..	..	..	..	Forge wagon (Mk. II only) No. 3 drawer, wheelers' tool chest.

§ Field forge, Mark IV only.

* Carried as convenient.

STORES FOR USE WITH SICK HORSES.
(Carried in R.A. Store Wagon and Limber.)

TABLE 23.		War. Total per Battery.	Peace.
			Per 100 Horses (3 Months' Supply.)
Bandages, horse .. .. .	..	9	6
Canvas, packing	yds.	3	2
Corks, assorted .. .. .	..	9	6
Flannel, old, for fomentations ..	lb.	11	7½
Linen, unbleached	yds.	4½	3
Numnahs, old .. .. .	..	2	2
Paper, white fine	quiro	½	½
" brown, common	"	½	½
Pins, mixed	oz.	½	½
Sponges, G.S. .. .. .	..	2	2*
Tape, white ¾-inch	pieces	1	1*
Tow { coarse	lb.	6	2
{ fine .. .. .	..	1½	1
Twine, packing, small	oz.	2	1
Valise, veterinary stores† .. ..	..	1	—

"Panniers, veterinary, field," will be issued on mobilization only by Veterinary Department, and carried in Artillery wagons.

* To be drawn at these rates every six months only.

† Issued on mobilization by the Veterinary Department.

ARMY BOOKS AND FORMS FOR EQUIPMENT.

TABLE 24.

Army No.	Subject.	Description.
<i>Books.</i>		
183*	Regimental Equipment	Account Ledger.
243*	Regimental repairs	Demand Book.
*244	"	Daily Work Book.
<i>Forms.</i>		
27½	Practice, annual	Battery, Report.
275	"	Battery and Report.
276	Range	Report.
751*	Stores	Convoy Note.
801	Ammunition, gun and small-arm, blank..	Requisition.
806	Ammunition, gun practice, and for dismissal of recruits..	"
815	Ammunition small-arm, practice and exercise	"
820	Arms	"
884	Ordinance, camp equipment, tools, &c. ..	Receipt and Issue Voucher.
888	"	Requisition.
951	Accoutrements	Receipt and Issue Voucher.
952	"	Requisition.
956	" materials for repairs	Receipt and Issue Voucher.
957	"	Requisition.
976*	Carriages, materials for repair	"
980*	Stores	Carrier's Note.
997*	Equipment in general (blank)	Requisition.

ARMY BOOKS AND FORMS FOR EQUIPMENT—continued.

Army No.	Subject.	Description.
G 1010	Harness and saddlery	Receipt and Issue Voucher.
G 1011	" " materials for repair	" "
G 1012	" "	Requisition.
G 1027*	Equipment in general, materials for repair (blank)	Requisition.
G 1033*	" "	Receipt and Issue Voucher.
G 1037*	" " materials for repair	Requisition.
G 1040	Instruments, musical	Receipt and Issue Voucher.
G 1041	Signalling Implements, and Instruments, musical	Requisition.
G 1046	Tools	Receipt and Issue Voucher.
G 1047	"	Requisition.
G 1049	Equipment in general	Expenditure, Transfer, and Conversion Voucher.
P 1925	" "	Expense Voucher.

Those marked (*) are all that are considered necessary for War, and are carried in stationery box in Store Wagon, R.A.

DETAILS OF COMPONENT PARTS, CARRIAGE, FIELD, B.L., 5-INCH
HOWITZER. (MARK I.)

TABLE 25.	Description.	No. to a Set.
Axletree, 2nd Class, "C," No. 204	.. .. .	steel 1
Bands {	with bucket hook, set screw, { left	" 1
	and advance ring { right	" 1
	stop elevation, steel with set screw	" 1
	elevating gear { front	metal 1
Brackets {	(with bolts) { rear, with nut and split key	" 1
	{ Q. drag chain { left	steel 1
	{ right	" 1
Block, housing oil can	.. .. .	wood 1
Capsquares {	left	steel 1
	right	" 1
Carriage, body, without fittings	.. .. .	" 1
Chains {	drag shoe, No. 19	2
	suspending drag shoe { inside, with spring clips	2
	{ outside "	2
Cradle, with 2 hydraulic buffers, consisting of:—		
Bolts, tension springs	.. .. .	steel 4
Collars, compressing springs {	plain	" 4
	with boss	" 4
Cradle, steel, with metal liners	.. .. .	" 1
Glands, rod, piston	.. .. .	metal 2
Nuts, bolt spring, steel, with check nut and split key	.. .. .	" 4
Packing, hydraulic, ½-inch, square section, length of 3-feet 4-inches		lengths 2
Pipes, connecting, buffers, copper, with fittings	.. .. .	" 1
Pistons, steel, with rods and nuts	.. .. .	" 2
Plates, dividing springs, iron	.. .. .	" 4
Plugs {	cylinder	metal 2
	filling hole, No. 2	P.B. 2
Springs, spiral, steel	.. .. .	" 8

DETAILS OF COMPONENT PARTS, CARRIAGE, FIELD, B.L., 5-INCH
HOWITZER. (MARK I.)—continued.

TABLE 25—continued.	Description.	No. to a Set.
<i>Cradle—continued.</i>		
Screws {	lubricating, metal boss head, $\frac{3}{8}$ -inch	4
	set, buffer tube steel	2
Tubes {	pipe connecting metal	2
	buffer steel	2
Washers, packing, pipe connecting buffers (leather)	.. .. .	2
" " hydraulic buffers (lead) {	large	2
	small	2
Eye, trail, No. 24 .. .. .	.. .. .	1
Flanges, axletree {	left steel	1
	right	1
Handles, lifting .. .. .	.. .. .	2
Hooks, drag shoe and chain {	centre	2
	front	2
	rear	2
Keys, capsquare {	No 18, steel, with chain, left	1
	" 19, " " right	1
Loops {	drag chain { left steel	1
	right	1
	chain suspending, steel, with nut, and split key	2
	carrying handspike iron	1
Pins {	joint, capsquare, steel, with split key	2
	linch, 2nd Class steel	2
Plates {	locking { left	1
	right	1
	loop, handspike	1
	packing, flange, axletree { left	1
	right	1
	securing, tube pocket, with bolt and screw	1
Rings, packing, arm axletree (plastic metal)	.. .. .	2
Shoe, drag, No. 8 .. .. .	.. .. .	2
Sole, drag shoe, No. 6 .. .. .	.. .. .	2
Sockets {	handspike iron	1
	compressing springs metal	1
Staples {	double, securing { handspike iron	1
	stave end	2
	lashing, common, riveting, $\frac{1}{8}$ -inch	3
Stays, tensile {	left, steel, with screw and bolts	1
	right " " "	1
Steels, movable, eye trail .. .. .	.. .. .	1
Washers, drag, 2nd Class, "C," with Q .. .. .	.. .. . steel	2
Wheels, 2nd Class, "C," No. 41 .. .. .	.. .. .	2
<i>Gear elevating—</i>		
Arc, segment, steel, with taper pin .. .. .	.. .. .	1
Guide, arc, segment, steel, with screws .. .. .	.. .. .	1
Guard, metal, with screws .. .. .	.. .. .	1
Spindle, worm, steel .. .. .	.. .. .	1
Wheels {	hand, metal	1
	mitre, metal, with taper pin	1
Worm, elevating, steel, " " .. .. .	.. .. .	1
<i>LEATHERWORK.</i>		
Box, tool .. .. .	.. .. .	1
Cases {	bit vent and rod vent	1
	rimmer, vent axial	1
Cover, can, lubricating, with strap .. .. .	.. .. .	1
Pockets {	key, fuze	1
	tube, L.S., special	1

DETAILS OF COMPONENT PARTS, CARRIAGE, FIELD, B.L., 5-INCH
HOWITZER. (MARK I.)—continued.

TABLE 25--continued.		Description.	No. to a Set.
Leatherwork—continued.			
Size. Service for which straps are required.			
Straps	securing	$\frac{3}{4}$ " x 10" posts, aiming	1
		1" x 13" brush, piasaba	1
		1" x 13" (with piece), handspike	1
		1" x 18" stave end	2
		1" x 22" D.L. wheel hand	1
	tampeon (special)	1" x 44" cover, breech	1
Ties	drag chain .. ..	.. ..	1
	linch pin .. ..	.. ..	2

DETAILS OF COMPONENT PARTS, LIMBER, FIELD, B.L., 5-INCH
HOWITZER. (MARK I.)

TABLE 26.		Description.	No. to a Set.	
Axletree, 2nd class, "C," No. 205 steel			1	
Boards	{	foot	1	
		platform	1	
Boxes	{	clinometer wood	1	
		grease, 3 lb. tin	1	
rent, pads, and discs steel			1*	
Can, lubricating, No. 3 tin			1*	
Flanges, axletree	{	inside {	near steel	1
			off	1
		outside {	near	1
			off	1
Futchels	{	inside {	near	1
			off	1
		outside {	near	1
			off	1
Hasp, box, clinometer			1	
Hooks	{	bucket steel	1	
		draught {	near	1
			off	1
Keys	{	limber, No. 12 iron	1	
		limber hook, No. 2, steel with chain	1	
		pin, pole, iron, spring, flat, with chain	1	
Pins	{	linch, 2nd class steel	2	
		pole	1	
		securing {	inside, steel with split key	2
Plates	{	axletree {	outside, " " " "	2
		camp kettle, steel, with hooks	1	
		carrying lubricating can and grease box steel	1	
Staples	{	nib pole,	" " " "	1
		lashing, with plate {	single, $\frac{1}{4}$ -inch iron	14
			double, $\frac{1}{4}$ -inch	1
		lashing, riveting, $\frac{5}{16}$ -inch	" " " "	6
pole steel			1	
Stays	{	futchel, front {	near	1
			off	1
		diagonal {	near	1
off			1	
Steels, movable, limber hook			1	
Turnbuckle, box, clinometer			1	

* Carriage limber only.

DETAILS OF COMPONENT PARTS, LIMBER, FIELD, B.L., 5-INCH
HOWITZER. (MARK I.)—continued.

TABLE 26—continued.		Description.	No. to a Set.
Washer, drag, 2nd class, "C,"			steel 2
Wheels, 2nd class, "C," No. 41			2
Poles, draught			1
Parts of:—			
Irons, nib			1
Loops, iron clip, point, pole.. .. .			1
Plates	{	wrapping pole, copper, with nails	1
		pin pole	2
Chains, draught pole, No. 2	{	bearing, bar pole	steel 1
		.. .. .	2
Bars, supporting, draught pole, No. 2			1
Swingletrees, No. 7 †			2
Box, ammunition			1
Parts of:—			
Brackets	{	fuze box,	steel 1
		disc stop { projec- { large, steel, with nut and split key	3
		tiles { small, " " " " " "	4
		hasp lid	steel 1
Discs, stop	{	staple, projectile strap	iron 38
		fuze and tube boxes	metal 1
		projectiles { large	3
			medium .. .. .	3
Handles, lid	{	small	1
		bottom { centre	iron 2
		near	steel 2
		off	" 1
Hinges, lid	{	top { centre	" 1
		near	" 1
		off	" 1
		.. .. .	" 1
Hooks, stop, projectile, iron, with loop plate			2
Irons, guard	{	No. 17, near	1
		No. 18, off	1
Keys, securing, lids, iron, with chain			2
Lock, metal, with key			1
Bands, strengthening	{	inside	steel 2
		outside	" 2
Plates	{	angle, { fuze and tube boxes	" 1
		disc stop { projectiles	" 6
		angle, 6" x 2½" x 2"	" 6
		escutcheon	iron 1
		guard, hinge { near	steel 1
			off .. .. .	" 1
		stop, lid, bottom { near	" 1
			off .. .. .	" 1
		striking	iron 1
		Socket, time and percussion fuze, metal .. .. .			1
Staples	{	lashing { with plate { single, ¼-inch	13
			treble, ¼ " " " " .. .. .	2
		common, riveting, ⅛ inch	2
			spade { near .. .. .	steel 1
off	" 1		
Trays, gun fittings	{	upper, "B"	wood 1
		lower, "A"	" 1
Turnscrew, shell plug			iron 1
Boxes, fuze, No. 23			tin 2

† No. 10 for future manufacture.

DETAILS OF COMPONENT PARTS, LIMBER, FIELD, B.L., 5-INCH
HOWITZER. (MARK I.)—continued.

TABLE 26—continued.	Description.	No. to a Set.
	LEATHERWORK.	
Cases	billhook	1
	drag washer { ordinary	1
	{ with Q.. .. .	1
	felling axe	1
Leathers, hand	lubricating can, No. 3	1*
	water brush	1
Pockets	key fuze, universal	2
	" spring lock	2
	linch pin	1
	<i>Size in inches.</i> <i>Service for which straps are required.</i>	
Straps, securing	1 x 10	1
	" "	1
	" "	1
	1 x 13	2
	" "	2
	" "	1
	1 x 13 D.L.	3
	1 x 18 D.L.	1
	1 x 18	1
	" "	2
	" "	2
	1 x 22	2
	1 x 26	1
	" "	1*
	1 x 32	4
	B.P., C.B. with stop } Blankets	
	1 x 44	1
	" "	2
Straps, withdrawing	clinometer	1
	projectiles { long	13
	{ short	6
Thongs	projectiles { large	3
	{ small	3
	disc, stop	1
	fuse boxes	2
Ties, linch pin	ammunition	1
	clinometer	2

* Gun limber only.

† The lifting jack is carried on the wagon limber only.

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION, B.L.,
5-INCH HOWITZER. (MARK I.)

TABLE 27.	Description.	No. to a Set.
Axletree, 2nd Class, "C," No. 38		1
Bands, box under,	front { near	1
	{ off	1
	rear { near	1
	{ off	1
Boards, foot		1
Boxes { grease, 14 lb.		2
	under	2
Chains, drag shoe, No. 18		1
Collars { tube, perch eye		6
	" plate, locking	1
Eye, perch, No. 9		1

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION, B.L.,
5-INCH HOWITZER. (MARK I.)—continued.

TABLE 27—continued.		Description.	No. to a Set.
Flanges, axletrees	{ perch	{ near steel	1
		{ off "	1
	{ side	{ near "	1
		{ off "	1
Hasps, box under, ..		.. .. . iron	2
Hooks	{ drag	{ chain, side "	1
		{ rear "	1
	{ bucket	.. .. . steel	1
Perch, steel		.. .. . "	1
Pins, lynch, 2nd Class		.. .. . "	2
Plates	{ camp, kettle, steel, with hooks..		2
	{ locking		2
	{ staple, drag shoe		1
	{ bracket, staple, drag shoe		1
Shoe, drag, No. 3		.. .. . iron	1
Sides	{ near	{ steel	1
		{ off "	1
Soles, drag shoe, No. 3		.. .. . "	1
Staples, lashing	{ common, riveting, $\frac{5}{16}$ inch		2
	{ with plate	{ single, $\frac{1}{4}$ iron	6
		{ handspike, rear "	1
	{ handspike, front		1
Stays	{ channel	{ centre steel	1
		{ near "	1
		{ off "	1
	{ perch	.. .. . "	2
Steels, movable, perch eye		.. .. . "	1
Turnbuckles, box, under ..		.. .. . iron	2
Washer, drag, 2nd Class, "C"		.. .. . steel	2
Wheels, 2nd Class, "C," No. 41		.. .. . "	2
Box, ammunition ..		.. .. . "	1
parts of:—			
Bands, strengthening	{ inside	{ steel	2
		{ outside "	2
Brackets	{ disc	{ fuze box "	2
		{ stop "	2
	{ projec-	{ large, steel, with nut and split key	4
		{ tiles { small "	4
	{ hasp, lid	.. .. . steel	1
	{ staple, projectile strap	.. .. . iron	48
Discs, stop,	{ fuze and tube boxes metal		1
	{ projectiles	{ large "	4
		{ small "	4
Handles, lid, ..		.. .. . iron	2
Hinges, lid, bottom	{ centre	{ steel	1
		{ near "	1
		{ off "	1
Hinges, lid, top	{ centre	{ "	1
		{ near "	1
		{ off "	1
Irons, guard	{ No. 17, near	{ "	1
		{ " 18, off "	1
Keys, securing, lids, iron, with chain..		.. .. . "	2
Locks, metal, with key..		.. .. . "	1
Plates	{ angle, disc stop	{ fuze and tube boxes steel	2
		{ projectiles "	8
	{ " 6" x 2 $\frac{1}{2}$ " x 2", "		6
	{ escutcheon, iron		1
	{ guard, hinge	{ near, steel	1
		{ off, "	1
	{ stop, lid, bottom	{ near "	1
		{ off "	1
	{ striking iron		1
			1

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION, B.L.,
5-INCH HOWITZER. (MARK I.)—continued.

TABLE 27—continued.		Description.	No. to a Set.
		Socket, time and percussion fuze metal	1
		Staples, lashing, with plate { double, $\frac{1}{4}$ -inch	2
		single, $\frac{1}{4}$ "	13
		treble, $\frac{1}{4}$ "	2
		hand leathers	2
		Stop, fuze and tube box steel	1
		Tray, small stores wood	1
		Turnscrew, shell plug iron	1
		Boxes, fuze, No. 22 tin	3
LEATHERWORK.			
		Case, tube pocket	1
		Holdall, needles and silk twist	1
		Leathers, hand	2
		Loops { case, saw	1
		handspikes, and maul	1
		Pockets, key { fuze, universal	2
		spring, lock	1
		Size. Service for which straps are required.	
		$\frac{1}{4}$ " x 13" .. sword-bayonets	2
		1" x 10" .. kettles, camp	2
		1" x 13" .. case, tube pocket	2
		1" x 15", D.L. .. box, key, test and firing	2
		1" x 13" " .. lantern bull's-eye	1
		1" x 18" " .. " " " "	1
		1" x 18" " .. key, test and firing	2
		1" x 22" " .. swords	2
		1" x 30" .. maul	4
		1" x 32" .. blankets	1
		B P., C.B., with stop .. handspikes	2
		1" x 36" .. kettles, camp	2
		1" x 41" .. posts, picket	2
		1" x 41" .. shoe, drag	1
		1 $\frac{1}{2}$ " x 30"	1
		Straps { withdrawing projectiles { long	16
		short	8
		Thongs { disc stops { projectiles { large	4
		fuze boxes	4
		small	2
		lid box { ammunition	2
		under	2
		Ties { drag chain	1
		linch pin	2

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION AND STORE,
R.A. (MARK II*).

TABLE 28.		Description.	No. to a Set.
DETAIL OF WOODWORK.			
Body.			
		Bar, stay, loading	1
		Blocks, axletree	2
		foot	1
		Boards { head	1
		partition	1
		tail	1

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION AND STORE,
R.A. (MARK II*.)—continued.

TABLE 28—continued.		Description.	No. to a Set.
DETAIL OF WOODWORK—continued.			
Frame, bottom—			
Consisting of—			
Bar, cross	..	..	1
Beards, bottom	..	..	14
Bolsters	{ body	{ front	1
		{ rear	1
	{ wheel, plate	{ front	1
		{ rear	1
Earbeds	{ front	..	1
	{ rear	..	1
Locker (complete)	..	..	1
Sides	{ near..	..	1
	{ off ..	..	1
Summers	..	..	2
Hoops, bale (set of 5)	..	..	sets 1*
Seat	{ and box, driver's	..	1
	{ with back	..	1
Sides, complete with 3 stud staves and 1 cleat			
{ near..			1
{ off ..			1
Fore Carriage.			
Bars	{ supporting draught pole, No. 2	..	1
	{ splinter	..	1
	{ sweep	..	1
Blocks, axletree	..	..	2
Bolsters	{ bottom..	..	1
	{ top ..	..	1
	{ wheel, plate	..	1
Futchels	{ outside	..	2
	{ inside ..	..	2
Swingletrees, No. 7	..	..	2
Pole, draught, No. 2	..	..	1
WHEELS.			
†Wheels, 2nd class	{ B, No. 28, fore	..	2
	{ C, „ 39, hind	..	2
Parts of—			
Bolts, with nuts, nave, 2nd class	..	..	48
Boxes, pipe	{ No. 28, wheel..	..	2
	{ „ 39, „	..	2
Felloes	{ No. 28, wheel	..	12
	{ „ 39, „	..	12
†Flanges, metal,	{ No. 28, wheel	{ front	2
		{ rear ..	2
	{ „ 39, „	{ front	2
		{ rear ..	2
Pieces, wood, filling ..	..	..	48
Spokes	{ No. 28, wheel	..	24
	{ „ 39, „	..	24

* These articles are required with each complete wagon, but are charged separately and must be so demanded.

† The wheels first issued with the wagon were:—

Fore, No. 33 } with wood naves.
Hind, No. 32 }

Later issues of the wagons may be met with having:—

Fore, No. 28
Hind, Nos. 25, 27 or 39 } with metal naves.

Nos. 28 and 39 will only be issued to replace existing wheels of other numbers as the latter become unserviceable.

‡ Future manufacture will be of steel.

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION AND STORE,
R.A. (MARK II*.)—continued

TABLE 28—continued.	Description.	No. to a Set.	
DETAIL OF IRONWORK.			
Body.			
Axletree, iron, 2nd class, C, No. 97	.. .. .	1
Boxes, grease, half round, 3 lbs...	.. .. .	2
Bracket, iron drag shoe	.. .. .	1
Buttons, metal, cover board, main pin	.. .. .	2
Chains, iron, tailboard, with loops	.. .. .	2
Clips, iron, axletree	.. .. .	2
Collars, iron axletree*	{ shoulder	2	
	{ point	2	
Hasps, iron	{ seat and box drivers	1	
	{ locker	1	
Hinges	{ iron locker	2	
	{ metal, seat and box, drivers	2	
	{ bucket	1	
	{ drag chain	1	
Hooks, iron	{ chain, tailboard, with loop	2	
	{ with joint head and tailboards, plain	3	
	{ plate { lashing	1	
		12	
Irons	{ guard seat, No. 30	2	
	{ nib	4	
Joints, iron	{ head board	2	
	{ seat with back { top	2	
		{ under	2
		{ with hasp	1
Keys, iron, with chain	{ split flat { guard, iron	4	
		{ tailboard	1
	{ head and tail	4	
	{ stay, joint, footboard	2	
Loops, iron	{ lashing, spare wheel	2	
	{ with chain, bar loading	1	
Pins	{ linch, 2nd class steel	2	
	{ main, No. 24, iron, with collar and key	1	
	{ cast iron, distinguishing	1	
	{ angle, strengthening { long	2	
		{ short	2
Plates	{ camp kettle, with hooks	2	
	{ clip, bolster	1	
	{ for stay clip, boards, side { large	2	
		{ small	2
iron	{ clip, stay, joint, footboard	2	
	{ locking { body	1	
		{ wheels	1
	{ socket guard iron	4	
	{ strap, joint, tailboard	2	
	{ strengthening locker	2	
	{ wrapping { head board	2	
		{ tail	2
Screws, looped, No. 3, flat	.. .. .	36
Shoe, iron, drag, No. 4, with chain attached	.. .. .	1
Sole, steel, drag, shoe, No. 3	.. .. .	1
Sockets, M.C.I., guard iron	.. .. .	4

* Only required when running 2nd class B wheels on C axletrees.

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION AND STORE,
R.A. (MARK II*.)—continued.

TABLE 28—continued.		Description.	No. to a Set.
DETAIL OF IRONWORK—continued.			
Staples, iron	{	bale, hoop { bevelled	12
		clip, axletree { plain	8
		joint, seat	4
		lashing { common	2
			with plate { double .. .. .	5
		{ single	17
			round crowned, small .. .. .	12
		stud stave	12
Stays, iron	{	clip { bar, loading	6
		partition board	1
		cross, axletree	1
		joint, footboard	1
		strengthening bolster	2
		T axletree, complete	2
Turnbuckles, iron	{	head board	1
		locker	1
seat and box, drivers		1	
Washers, iron, drag, 2nd class C		2	
Fore Carriage.			
Axletree, iron, 2nd class B, No. 33		1	
Bollards, iron		2	
Clips, iron axletree		2	
Hooks, steel, draught with bolt and nut		2	
Keys, iron, with chain, split, fat, pin, pole		1	
Pins	{	iron, pole with chain	1
		linch, 2nd class, steel	2
Plates, iron	{	clip { bollard	2
		bolster	1
		locking, wheel	1
		main pin	1
		strengthening { futchel	2
{ sweep bar	1		
	Sockets, iron	{	pole end .. .. .	1
splinter bar			2
clip, axletree			4
Staples, iron	{	lashing { common, 4-inch	6
		round, crowned, small	2
		pole	1
Stays, iron	{	cross axletree	1
		splinter bar	4
		T axletree, complete	2
Washers, iron, drag, 2nd class B		2	
Pole Draught.			
Loops, iron, clip, point pole		1	
Plates	{	iron, strengthening pole	2
		steel, bearing bar pole	1
Chains, iron, draught pole, No. 2		2	

DETAILS OF COMPONENT PARTS, WAGON, AMMUNITION AND STORE,
R.A. (MARK II*.)—continued.

TABLE 28—continued.		Description.	No. to a Set.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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* These articles are required with each complete wagon, but are charged separately, and must be so demanded.

DETAILS OF COMPONENT PARTS, WAGON, ARTILLERY.
(MARK I*.)—continued.

TABLE 29.		Description.								No. to a Set.
DETAIL OF WOODWORK.										
<i>Body.</i>										
Boards	{	head	..	..	..	..	..	..	..	1
		partition	{	front	..	..	..	..	..	1
				rear	..	..	..	..	..	1
			tail	..	..	..	..	..	..	1
Blocks	{	axletree	..	..	..	..	..	..	..	2
		stay, spare wheel	..	..	..	..	..	..	..	1
		check	..	..	..	..	..	..	..	2
Frame bottom—										
Consisting of—										
		Bar, cross	..	..	..	..	..	..	..	1
		Boards, bottom	..	..	..	..	..	..	..	16
Bolsters	{	body	..	..	..	..	..	..	..	1*
		wheel plate	{	front	..	..	..	..	..	1*
				rear	..	..	..	..	..	1*

* Bolsters of this description are required for both kinds of wagons, but differ in pattern.

NOTE.—Artillery wagons are to be fitted with an arm in rear, to carry a spare sub-division wheel.

* These articles are required with each complete wagon, but are charged separately and must be so demanded.
 † Articles, special, for wagons fitted with ordinary main pin and wheel plate.
 ‡ Bolsters of this description are required for both kinds of wagons, but differ in pattern.
 § Future manufacture will be of steel.

DETAILS OF COMPONENT PARTS. WAGON, ARTILLERY.
(MARK I*.)—continued.

TABLE 29—continued.	Description.	No. to a Set.	
DETAIL OF IRONWORK—continued.			
Hooks, iron	drag shoe and chain	1	
	headboard	2	
	with plate { Joint head and tailboard { plain	3	
		lashing { half round	2
			with keyway .. .. .	4
Irons	guard, seat, front	12	
	nib	2	
	scroll { front	4	
Joints, steel, seat, hind	rear	2	
	.. .. .	2
Keys	iron, split, flat, hook joint, head and tailboard, with chain	2	
	steel, head and tail, with chain	4	
Lubricator, metal ball, main pin .. .. .	.. .. .	1*
Pins	linch, 2nd class, steel (special)	2	
	main { No. 2, iron, with collar and key	1†	
		3, steel, with metal ball, collar and key	1*
Plates	cast iron, distinguishing	1	
	iron { camp kettle, with hooks	2	
		clip, bolster	1*
		locking wheels	1
		main pin	1*
		strap joint { headboard	2
	wrapping { tailboard	2	
		headboard	2
		tailboard	2
	steel { clip rave, with stays	10	
		coupling, spring	8
locking, body		1	
Screws, looped, No. 3, flat .. .. .	.. .. .	32
Shoe, iron, drag, No. 6 .. .. .	.. .. .	1
Sole, steel, drag shoe, No. 15 .. .. .	.. .. .	1
Socket, metal ball, main pin .. .. .	.. .. .	1*
Springs, steel	side, hind, with fittings	2	
	spiral { lubricating	1*	
		main pin	1*
Staples	iron { lashing { common { 1/4-inch	18	
		with plate { 3/8 "	6
			double .. .. .	10
	single	14	
		socket ball, main pin	2*
	balehoop { driving	8	
		plain	28
steel { joint seat	2		
	rave	10	
	stud stave	8	
Washers, iron drag, 2nd class (special) .. .. .	.. .. .	2
Fore Carriage.			
Axletree, steel, 2nd class C, No. 39 .. .. .	.. .. .	1
Clips, iron, axletree .. .. .	.. .. .	2
Hooks, steel, draught, with bolt and nut .. .. .	.. .. .	2

* Articles, special, for wagons fitted with ball and socket, main pin.

† Articles, special, for wagons fitted with ordinary main pin and wheel plate.

DETAILS OF COMPONENT PARTS, WAGON, ARTILLERY.
(MARK I*.)—continued.

TABLE 29—continued.		Description,	No. to a Set.
DETAIL OF IRONWORK—continued.			
Iron, scroll	{ front..	.. .. .	2
	{ rear ..	.. .. .	2
Keys, iron, split, flat, with chain, pin pole		.. .. .	1
Pins	{ iron, pole, with chain ..	.. .. .	1
	{ lynch, 2nd class, steel (special) ..	.. .. .	2
	{ clip, bolster ..	.. .. .	1*
	{ friction, bolster ..	.. .. .	2†
Plates	{ iron { locking wheel ..	.. .. .	1*
	{ main pin ..	.. .. .	1*
	{ clip, spring, plain ..	.. .. .	2†
	{ steel { coupling, staple, bolster ..	.. .. .	1†
	{ locking bolster ..	.. .. .	1†
	{ strengthening sweep bar ..	.. .. .	1
Sockets, iron	{ pole end ..	.. .. .	1
	{ splinter bar ..	.. .. .	2
Springs, steel, side, fore, with fittings		.. .. .	2
	{ bolster ..	.. .. .	2†
Staples, iron	{ pole ..	.. .. .	1
	{ socket, pole ..	.. .. .	2
	{ lashing, common, ½-inch ..	.. .. .	4
Stays, steel, splinter bar	{ flat { long ..	.. .. .	2
	{ short ..	.. .. .	2
	{ round ..	.. .. .	2
Washers, iron, drag, 2nd class (special)		.. .. .	2
Pole.			
Loops, iron, clip, point pole		.. .. .	1
Plates	{ iron, strengthening pole ..	.. .. .	2
	{ steel, bearing bar pole ..	.. .. .	1
Chains, iron, draught pole, No. 2		.. .. .	2
LEATHERWORK.			
Leathers, fixture	{ cases { billhook ..	.. .. .	1
	{ felling axe ..	.. .. .	1
	{ sword ..	.. .. .	6
	{ spade ..	.. .. .	1
	{ shovel ..	.. .. .	1
	{ for { carbines ..	.. .. .	2
	{ axe, pick { long ..	.. .. .	1
	{ short ..	.. .. .	1†
	{ maul ..	.. .. .	1
	{ ½" x 16" ..	.. .. .	6
	{ 1" x 10" ..	.. .. .	4
	{ 1" x 13" ..	.. .. .	4
	{ 1" x 18" ..	.. .. .	4
	{ 1" x 22" ..	.. .. .	2
Straps, securing	{ 1" x 26" ..	.. .. .	15
	{ 1" x 30" ..	.. .. .	2
	{ 1" x 36" ..	.. .. .	7
	{ 1" x 44" ..	.. .. .	3
	{ 1" x 54" ..	.. .. .	4

* Articles, special, for wagons fitted with ordinary main pin and wheel plate.

† " " " " ball and socket main pin.

DETAILS OF COMPONENT PARTS, WAGON, ARTILLERY.
(MARK I*)—continued.

TABLE 29—continued.	Description.	No. to a Set.
LEATHERWORK—continued.		
Cover, canvas, waterproof	.. .. .	1*
Lashings, tarred	{ 1½-inch, 32 feet, wagon cover	2*
	{ 1-inch, 20 feet (spare wheel)	3

* These articles are required with each complete wagon, but are charged separately, and must be so demanded.

NOTE.—Wagons fitted with ordinary main pin and wheel plate take one more strap of 1" x 18" and one less of 1" x 26", and the additional fixture leather marked thus* ", consequent upon the altered position of carrying the pickaxe.

DETAILS OF COMPONENT PARTS, WAGON, STORE, R.A., MARK II.

TABLE 30.	Description.	No. to a Set.
DETAIL OF WOODWORK.		
Board, tail ..	.. .. .	1
Boxes	{ lantern, folding ..	1
	{ stationery ..	1
	{ front ..	1
	{ store { centre ..	1
	{ rear ..	1
Hoops, bale (set of 4)	.. .. . set	1*
Props ..	.. .. .	4
DETAIL OF IRONWORK.		
Axletree, steel, 2nd class C, No. 38	.. .. .	1
Bearings, steel, axletree	{ bottom ..	1
	{ top { left ..	1
	{ right ..	1
Brackets, steel, screw thumb, securing boxes	.. .. .	4
Chains, iron	{ crow bar with ring and loop ..	1
	{ drag shoe, No. 10 ..	1
Eye perch, iron, No. 7	.. .. .	1
Flanges, steel, side, axletree	{ left ..	1
	{ right ..	1
Handles, iron, heart plate, with nib	{ left ..	3
	{ right ..	3
Hasps, iron	{ stationery box ..	2
	{ store boxes ..	6
	{ tailboard ..	1
Hinges, iron, tailboard	{ left ..	1
	{ right ..	1
	{ chain ..	1
Hooks	{ iron { drag ..	1
	{ lashing ..	2
	{ with plate ..	10
	{ steel, camp kettle ..	4

* These articles are required with each complete wagon, but are charged separately, and must be so demanded.

* Future manufacture will be of steel.

DETAILS OF COMPONENT PARTS, WAGON, STORE, R.A.
(MARK II.)—continued.

TABLE 30—continued.	Description.	No. to a Set.
LEATHERWORK—continued.		
Cover, canvas, waterproof	1*
Lashings, tarred { 1-inch, 10 feet	2
{ 1½ " 32 " wagon cover	2*
Ruler	1†
Bottles, ink (in brass case)	2†

* These articles are required with each complete wagon, but are charged separately, and must be so demanded.

† These form a part of the stationery box, and, as such, are issued with it.

DETAILS OF COMPONENT PARTS, WAGON, FORGE, R.A.
(MARK III.)

TABLE 31.	Description.	No. to a Set.
DETAIL OF WOODWORK.		
Board, tail	1
Boxes { lantern { distinguishing	1
	1
	1
	1
Chests, without drawers { smiths' tools	1
	1
Drawers { smiths' tool chest .. { No. 1, shoeing tools	1
	1
	1
	1
	1
	1
	1
	1
Hoops, bale (set of 4)	set 1*
Props	4
DETAIL OF IRONWORK.		
Axletree, steel, 2nd class C, No. 38	1
Bearings, steel, axletree { bottom	1
	1
Bolts { iron, straps, side boxes	2
	1
Brackets, steel, screw, thumb, securing boxes	8
Chains, iron, drag shoe, No. 10	1
Eye, perch, iron, No. 7	1
Flanges, steel, side, axletree { left	1
	1
Forge, field, G.S., Mark II, complete, with 1-cwt. anvil and block	1
Guides, steel angle { forge { tailboard	2
	2
	1
	1

* These articles are required with each complete wagon, but are charged separately, and must be so demanded.

(5465)

DETAILS OF COMPONENT PARTS, WAGON, FORGE, R.A.
(MARK III.)—continued.

TABLE 31—continued.		Description.	No. to a Set.
DETAIL OF WOODWORK—continued.			
Hasps, iron, boxes, side	..	..	2
Hinges	{ iron, tailboard	{ left	1
		{ right	1
	{ steel, guide, forge	{ left	1
		{ right	1
		{ large	1
Hooks	{ iron	{ drag { chain	1
		{ shoe	1
	{ steel, camp kettle	{ lashing { with plate	2
		{ securing side boxes	10
		{ lantern box	4
Irons, nib	{ tailboard		2
			2
Keys, iron, split, flat, with chain, tailboard	..	..	2
Perch, steel..	..	..	1
Pins, linch, 2nd class, steel	..	..	1
Plates	{ cast-iron, distinguishing..		1
		iron, bolt, securing, tool chests	1
	{ steel	{ connecting { front { left	1
		{ rear	1
		{ hinge guide	1
		{ lining, tailboard	1
		{ supporting forge	1
Screws, steel, thumb, with key and chain,	{ securing ..	{ lantern box	1
		{ tool chests and side boxes	8
Shoe, iron, drag, No. 3	..	..	1
Sides, steel	{ left		1
		{ right	1
Sole, steel, drag, shoe, No. 3	..	..	1
Staples	{ iron	{ round crowned, small	2
		{ lashing { riveting, $\frac{1}{8}$ -inch	8
		{ with plate, single	14
	{ propstick	{ front	1
		{ rear	2
	{ steel, bale, hoop	{ bevelled	12
		{ plain	4
Stays, steel	{ channel	{ centre { front	1
		{ rear	1
		{ front { left	1
	{ connecting, rear	{ right	1
		{ left	1
		{ right	1
			1
Steel, movable, perch eye	..	..	1
Turnbuckles, iron, boxes, side	..	..	2
Washers, steel, drag, 2nd class, C	..	..	3
WHEELS.			
Wheels, 2nd class C, No. 36	..	..	2
Parts of—			
Bolts, iron, nave	..	..	24
Boxes, pipe	..	..	2
Felloes	..	..	12
*Flanges, metal, nave	{ front		2
		{ rear	2
Pieces, wood filling	..	..	24
Spokes	..	..	24

* Future manufacture will be of steel.

DETAILS OF COMPONENT PARTS, WAGON, FORGE, R.A.
(MARK III.)—continued.

TABLE 31—continued.		Description.	No. to a Set.
LEATHERWORK.			
Leather, fixture, for maul	..	..	1
Straps, securing	{ 1" x 10"	..	2
	{ 1" x 13"	..	3
	{ 1" x 18"	..	2
	{ 1" x 26"	..	1
	{ 1" x 30"	..	4
	{ 1" x 36"	..	1
	{ 1" x 44"	..	5
	{ 1" x 54"	..	2
	{ 1" x 72"	..	2
	{ 1 1/2" x 102"	..	1
Ties { drag chain	..	..	1
	linch pin ..	..	2
Cover, canvas, waterproof..	..	..	1*
Lashings, { 1 inch, 10 feet	..	..	2
turred { 1 1/2 " 32 " wagon cover..	..	..	2*

* These articles are required with each complete wagon, but are charged separately, and must be so demanded.

DETAILS OF COMPONENT PARTS, LIMBERS, FORGE AND STORE
WAGONS.

TABLE 32.		No. to a Set.	
Description.		Forge, R.A., Mark III*.	Store, R.A., Mark II*.
Axletree, steel, 2nd class C, No. 38	..	1	1
Boards { foot ..	..	1	1
platform ..	..	1	1
Boxes, tin, grease, half-round, 3 lbs.	..	1	1
Brackets, steel { futchel { left ..	..	1	1
	right ..	1	1
	pole ..	1	1
	securing box ..	2	2
Flanges, steel, axletree, futchel { inside	..	2	2
	outside ..	2	2
Futchels, steel { inside { left ..	..	1	1
	right ..	1	1
	outside { left ..	1	1
	right ..	1	1
Hooks { iron, limber, No. 3 ..	..	1	1
	bucket ..	1	1
	steel draught { near ..	1	1
		1	1
		1	1
Keys { iron, spring, flat, pin pole, with chain	..	1	1
	steel, limber hook, No. 2, with chain	1	1
	iron, pole ..	1	1
Pins { steel, linch, 2nd class ..	..	2	2

DETAILS OF COMPONENT PARTS, LIMBERS, FORGE AND STORE
WAGONS—continued.

TABLE 32—continued.						No. to a Set.			
Description.						Forge, R.A., Mark III*.	Store, R.A., Mark II*.		
Plates, steel	{	angle, connecting	{	near	.. ..	1	1	
				off	.. ..	1	1	
				camp kettle, with hook		1	1	
				carrying, grease box		1	1	
				connecting	{	front	1	1
						rear	1	1
nib, pole .. ..				.. ..	1	1	
Screws, steel, thumb, securing box, with chain and key						2	2		
Staples	{	iron, lashing	{	$\frac{5}{8}$ -inch	.. ..	2	2	
				"	.. ..	10	10	
		with plate	{	double	.. ..	1	1	
				single	.. ..	5	5	
		steel, box, outside	{	left	.. ..	1	1	
				right	.. ..	1	1	
Stays, steel futchel	{	angle	{	centro	.. ..	1	1	
				rear	.. ..	1	1	
		front	{	near	.. ..	1	1	
				off	.. ..	1	1	
		Steels, movable, limber hook				1	1	
		Washers, steel, drag, 2nd class C..				2	2	
Pole, draught .. ..				.. ..	1	1	
Parts of—									
Irons, nib .. ..				.. ..	1	1	
Loop, iron, clip, point, pole..				.. ..	1	1		
Plates	{	with nails, copper, wrapping pole				1	1	
		iron, pin pole	2	2	
		steel, bearing bar pole	1	1	
Chains, draught, pole, No. 2 .. ..				.. ..	2	2	
Bars, supporting draught pole, No. 2 .. ..				.. ..	1	1	
Swingletrees, No. 7 .. ..				.. ..	2	2	
BOXES.									
Boxes, limber .. ..				.. ..	1	1	
Parts of—									
Boards, cover	{	large	.. ..	.. ..	.. ..	—	2
						small
Cover, canvas .. ..				.. ..	1	1	
Handles, iron, heart plate, with nib, double				.. ..	2	2		
Hasps, iron .. ..				.. ..	1	1	
Irons, guard	{	near	.. ..	.. ..	.. ..	1	1
		off	.. ..	.. ..	.. ..	1	1
" nib .. ..				.. ..	2	2	
Keys, iron, guard iron, with chain and loop				.. ..	4	4		
Lock, metal, complete, with key and stop pin				.. ..	1	1		
Plates, iron, striking..				.. ..	1	1		
Staples	{	iron, lashing, with plate	{	double	.. ..	2	2	
				single	.. ..	16	16	
		steel, spade	{	treble	.. ..	2	2	
				lower	.. ..	—	1	
Trays, wood	{	upper	.. ..	.. ..	.. ..	—	1
		long..	.. ..	.. ..	.. ..	1	—
		medium	.. ..	.. ..	.. ..	1	—
		short	.. ..	.. ..	.. ..	1	—

DETAILS OF COMPONENT PARTS, LIMBERS, FORGE AND STORE
WAGONS—continued.

TABLE 32—continued.					No. to a Set.	
					Forge, R.A., Mark III*.	Store, R.A., Mark II*.
BOXES.—continued.						
Turnbuckle, iron					1	1
Bottle, marking ink, ½-pint					1	—
dubbing, or soft soap					6	—
flour					1	—
glue					1	—
*Boxes, tin { leathers, hydraulic buffer					1	—
rivets, screws, and staples					—	2
tallow, Russian					—	1
wax { bees					—	1
black					1	—
linseed					1	—
olive					1	—
oil { rape					5	—
Rangoon					1	3
*Cans, tin { paint { black					1	—
white					1	—
varnish					1	—
turpentine					1	—
*Case, tin ink bottle					1	—
WHEELS.						
Wheels, 2nd class C, No. 3G					2	—
Parts of—						
Bolts, iron, nave					24	24
Boxes, pipe					2	2
Felloes					12	12
†Flanges, metal, nave { front					2	2
rear					2	2
Pieces, wood filling					24	24
Spokes					24	24
LEATHERWORK.						
Leathers, fixture	cases	billhook			1	1
		drag washer			1	1
		selling axe			1	1
		water brush			1	1
	loops	blanket			4	4
		selling axe			1	1
		pickaxe			1	1
Leathers, hand	for carbines				2	2
	.. .. .				2	2
Straps, securing	¾" x 13"				2	2
	1" x 10"				2	2
	1" x 13"				4	2
	1" x 18"				3	3
	1" x 22"				2	2
	1" x 26"				1	1
Ties, lynch pin	1" x 28" B.P.				4	4
	1" x 30"				2	2

The boxes and cans marked thus * form a part of the limber box, and as such are issued with it.

† Future manufacture will be of steel.



LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON & SONS,
PRINTERS IN ORDINARY TO HER MAJESTY.
(Wt. 19384 250 12 | 96—II & S 5465)

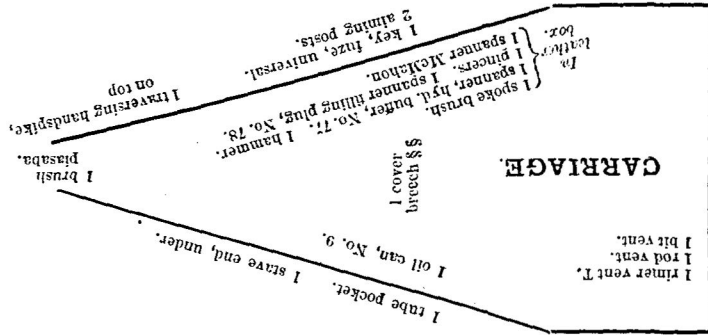
5-in. B.L. HOWITZER WAGON AND LIMB

LIMBER.

I spade.
ON TOP OF BOX "OFF."
I corn sack.
I great coat.
I blanket.
I valise, mess tin, canteen, field service cap, and helmet cover.

2 water buckets, } under.
1 clinometer, in box,
† 1 key, fuze, universal, in pocket.

Fuzes, percussion D.A., No. 3, II.	... 15
Fuzes, T & P middle, No. 54, II.	... 6
Tubes, friction, T...	... 30

[illegible][illegible]

1 water bucket.

n only.
not on howitzer.
in "

LIMBER.

[illegible]

I camp kettle, } under. 2 sword bayonets, on top. 2 water buckets, under.
 I grease box, } † 1 key, fuze, universal, in poc
 † 1 key, fuze, universal, in pocket. ** 1 clinometer, in box.

III

WAGON BODY.

Couples trace
Strap carrying projectile
Lanyards, friction tube	T	...
Key, fuze, universal

t posts, } under.
ing, 10 ft. }
kettle. }

3 picket posts, } and
1 lashing, 10 ft. }
1 camp kettle,

[illegible]

1 grease magazine,
under.
+ 1 key, faze, univers

hand saw, in case.
 maul, under.
 key lock, in pocket.

1 grease magazine,
under.
† 1 key, fuze, universal

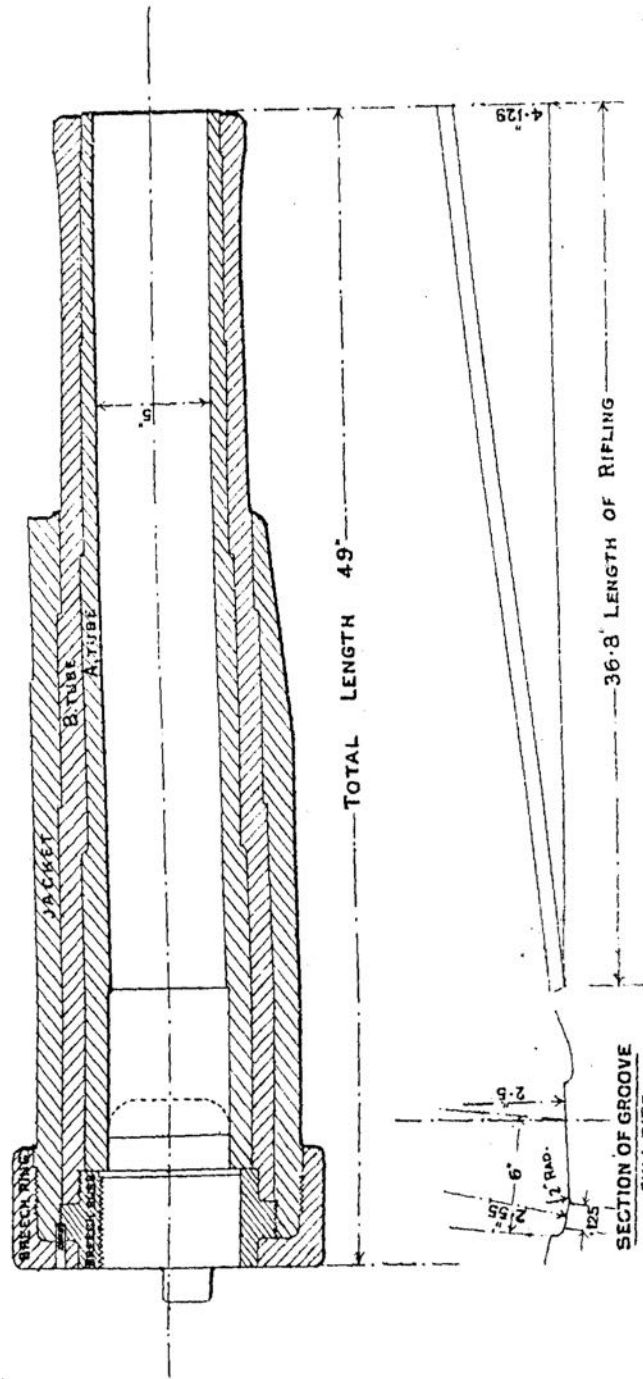
CONTENTS OF TRAY "A" WAGON.

Sassara, magazine...	...	1	Key, powder case ...	...	27
Knife, clasp ...	...	1	Keys, fuz, universal ...	...	1
Tube, T, drill ...	...	1	Collar, sliding, laying back ...	...	1
Holdall, with needles and twist ...	...	1	Cutters, wire ...	...	1

CONTENTS OF THE THREE FL

ORDNANCE, B. L., 5-INCH, HOWITZER, MARK I.

SCALE $\frac{1}{8}$ "



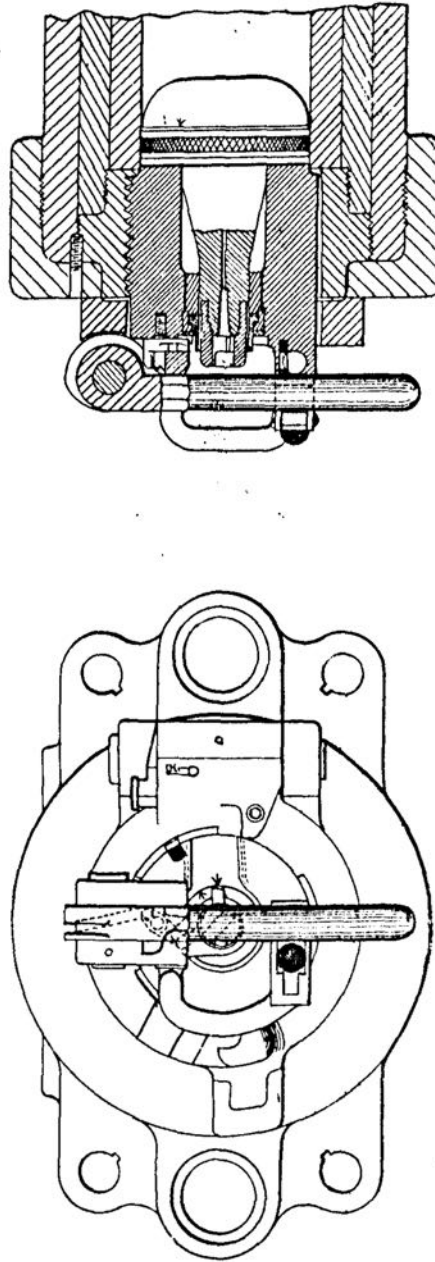
RIFLING:- UNIFORM TWIST OF 1 TURN IN 28 CALIBRES.

SECTION OF GROOVE
FULL SIZE
Nº OF GROOVES 20.

ORDNANCE, B.L., 5-INCH, HOWITZER, MARK I.

ARRANGEMENT OF BREECH MECHANISM.

SCALE 1/6TH

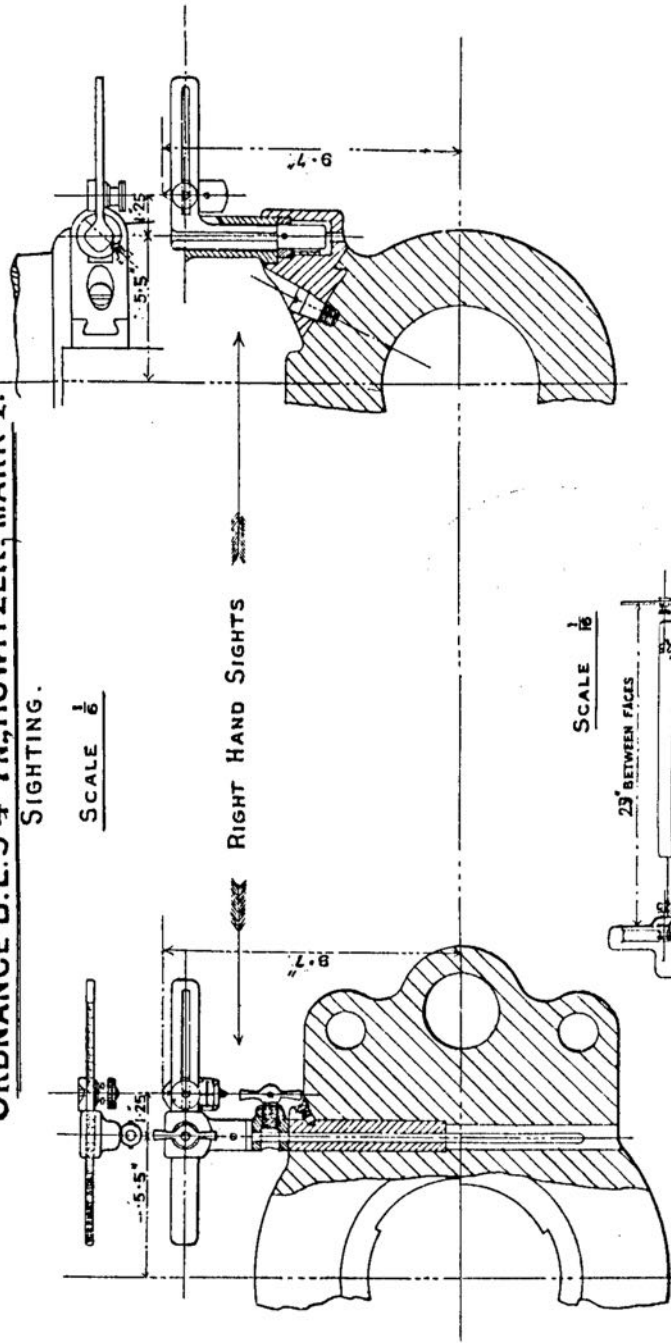


ORDNANCE B.L. 5-4 IN. HOWITZER, MARK I.

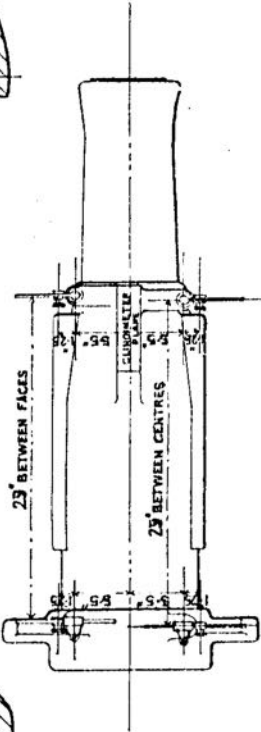
SIGHTING.

SCALE $\frac{1}{8}$

RIGHT HAND SIGHTS

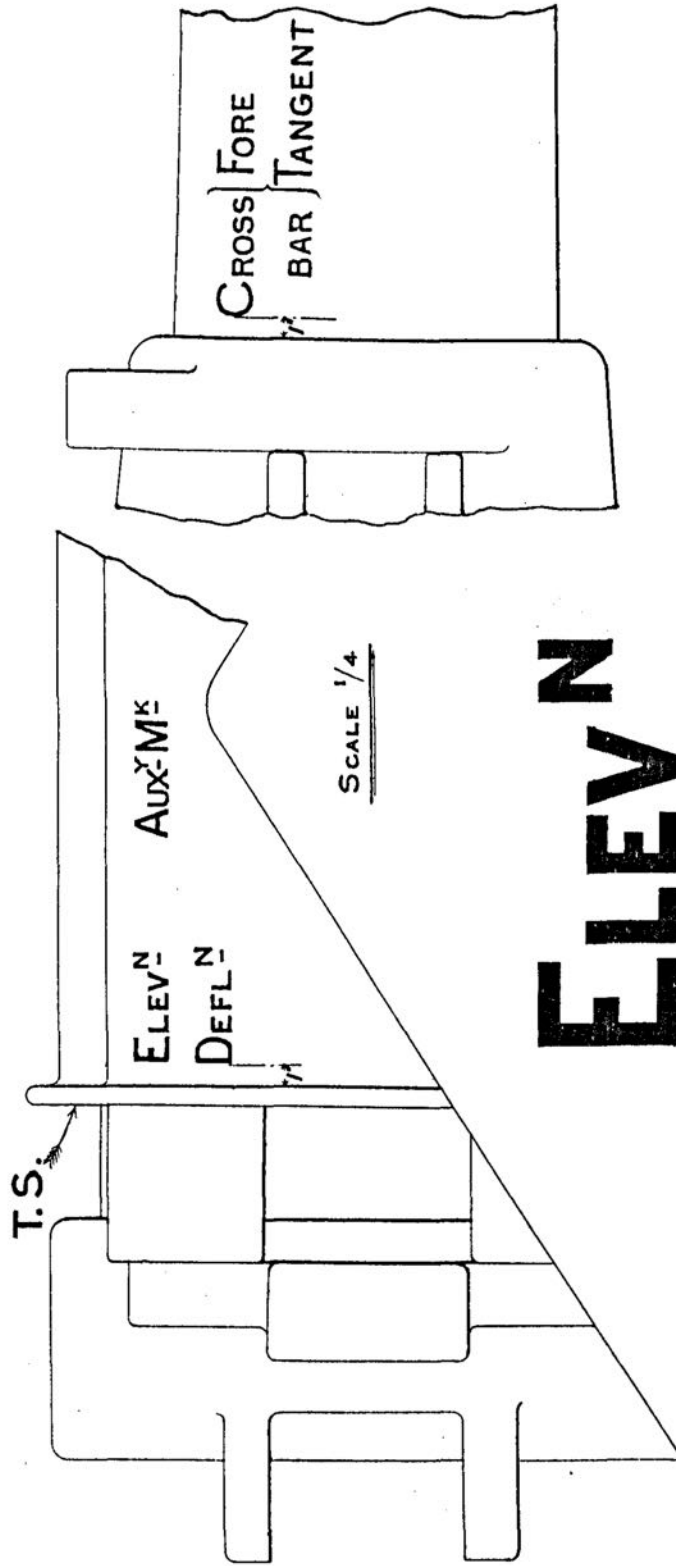


SCALE $\frac{1}{8}$



ORDNANCE, B. L., 5:4 IN., HOWITZER, MARK I.

STENCILLING

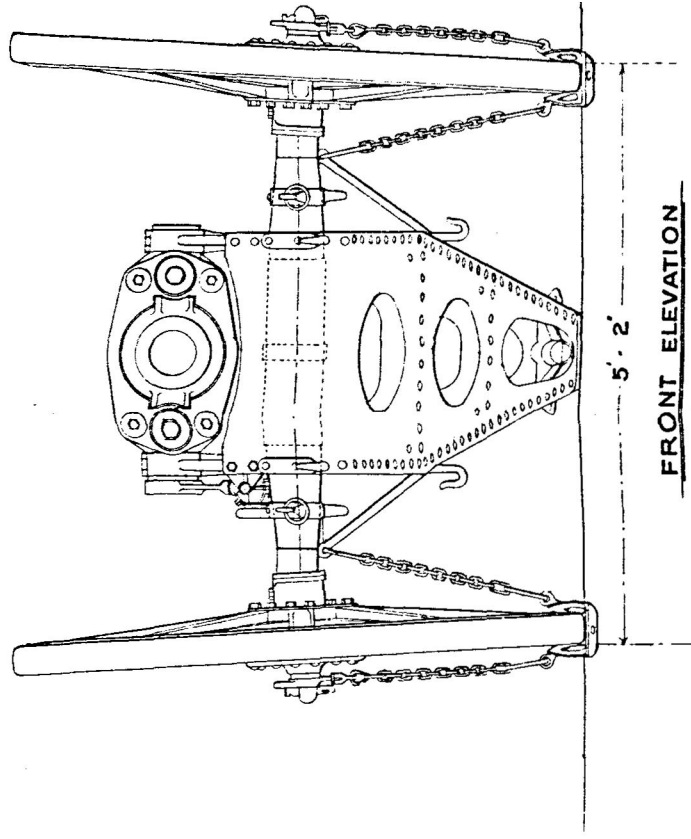
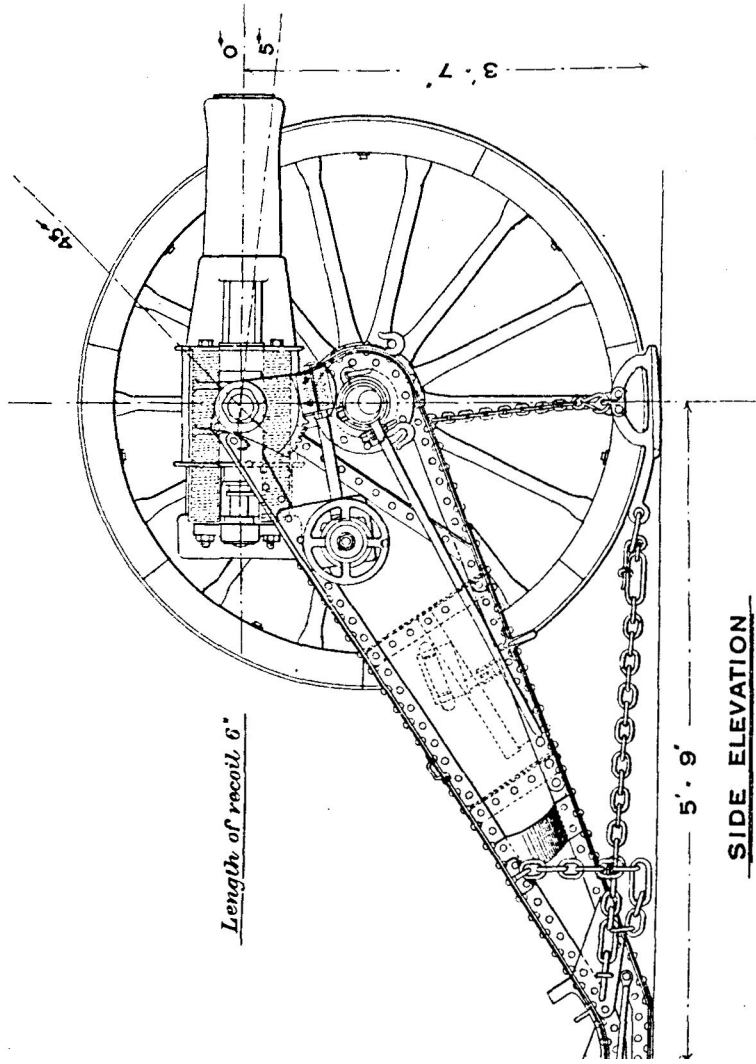


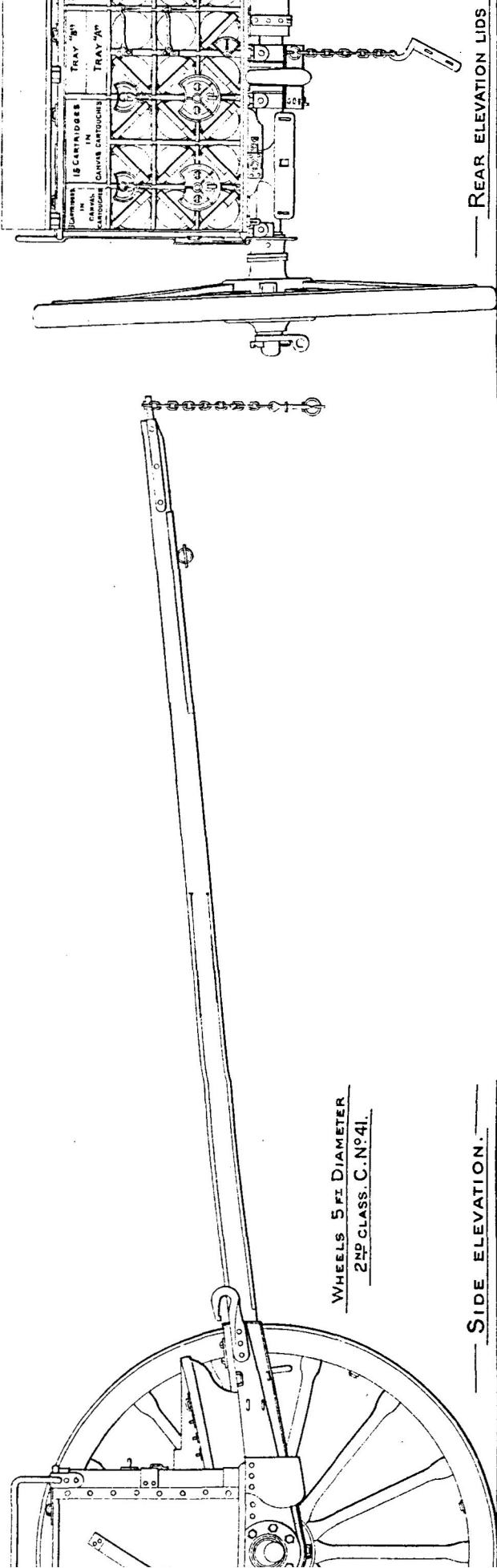
ELEV N

LETTERING FULL SIZE
TO BE STENCILLED ON IN WHITE PAINT

CARRIAGE, FIELD, B.L., 5-INCH, HOWITZER, MARK I.

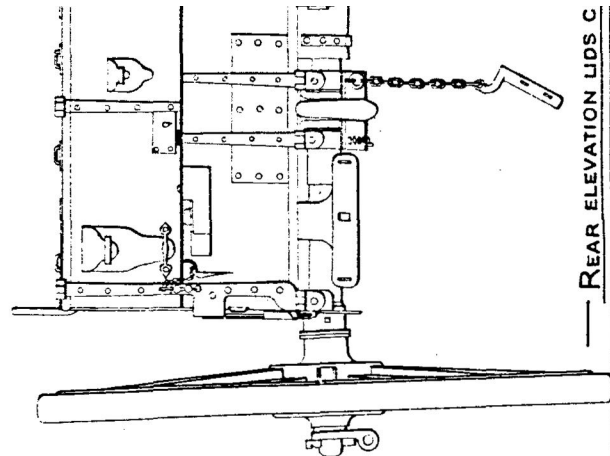
SCALE 1/20TH





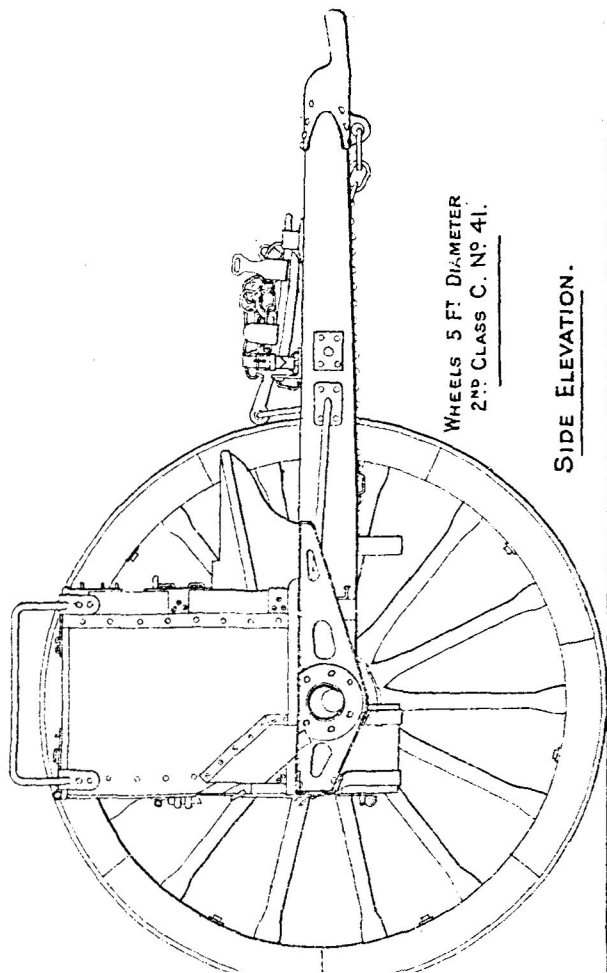
— REAR ELEVATION LIDS C —

5' 2"

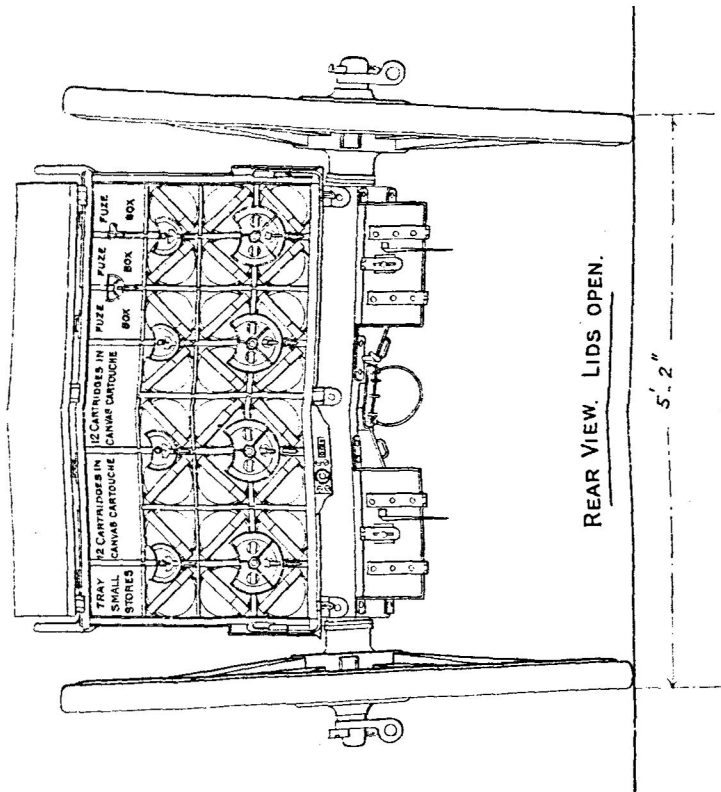


WAGON. {
CARRIAGE. {
NUMBER, FIELD, B.L., 5 INCH HOWITZER, MARK I.

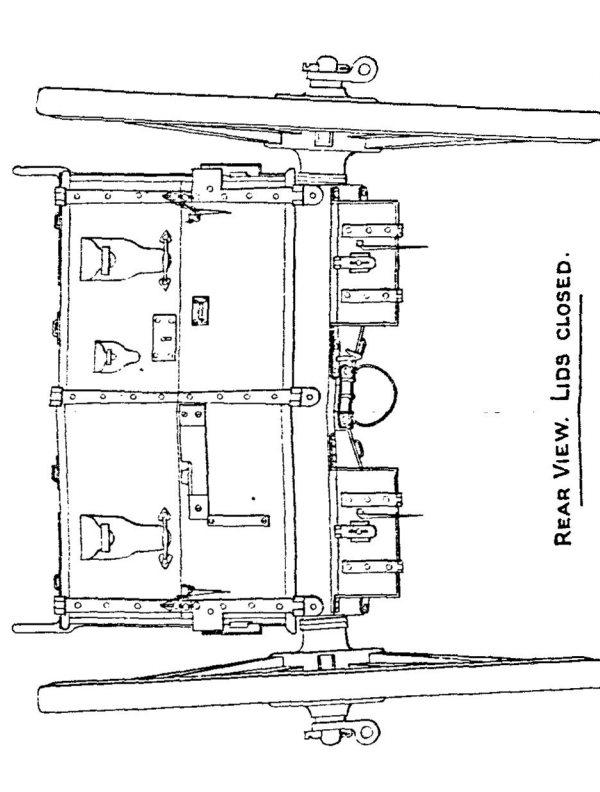
— SCALE 1/20TH —



SIDE ELEVATION.



REAR VIEW. LIDS OPEN.

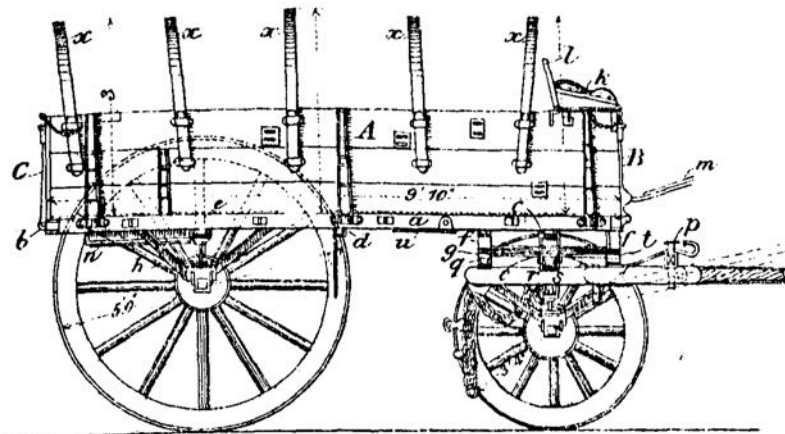


REAR VIEW. LIDS CLOSED.

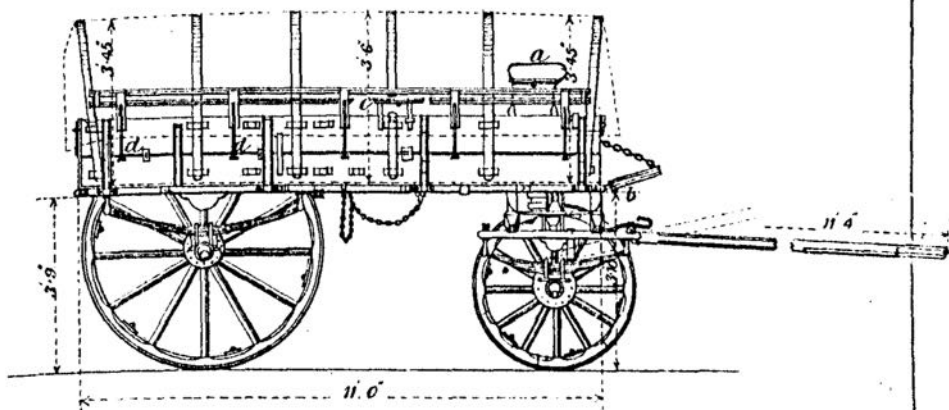
VAGON, AMMUNITION, B. L., 5 INCH. HOWITZER, MARK I.

Scale $\frac{1}{20}$ th.

WAGON, AMMUNITION & STORE, R. A., MARK II.*

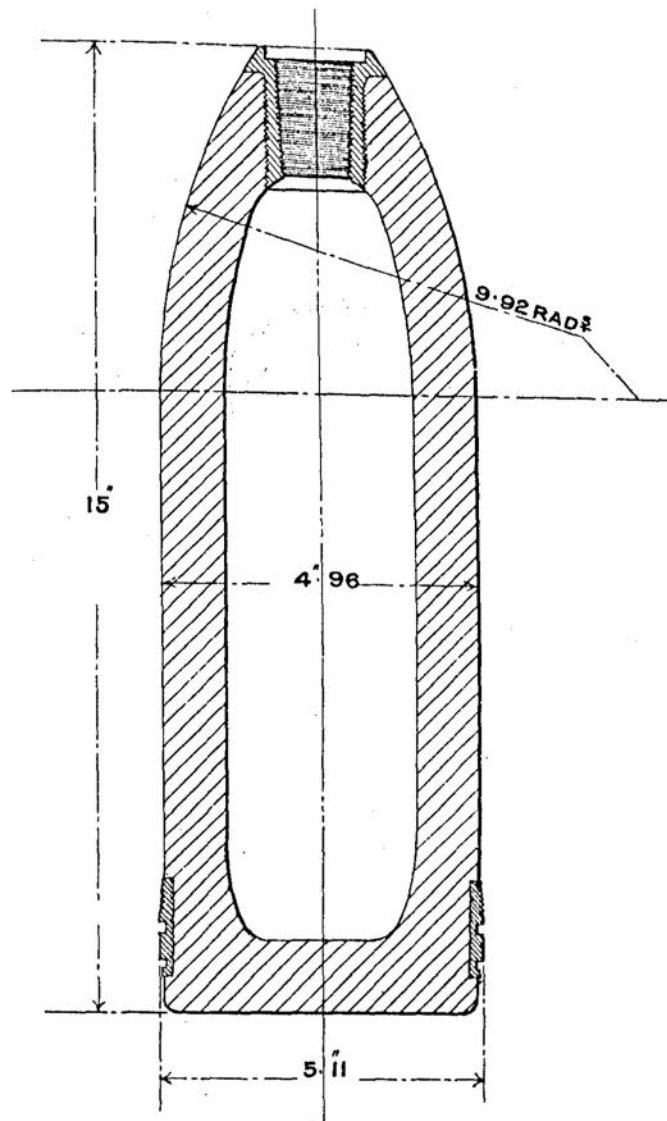


WAGON, ARTILLERY, MARK. I.*



SHELL, B.L., COMMON, 5 INCH, HOWITZER, IRON, MARK I.

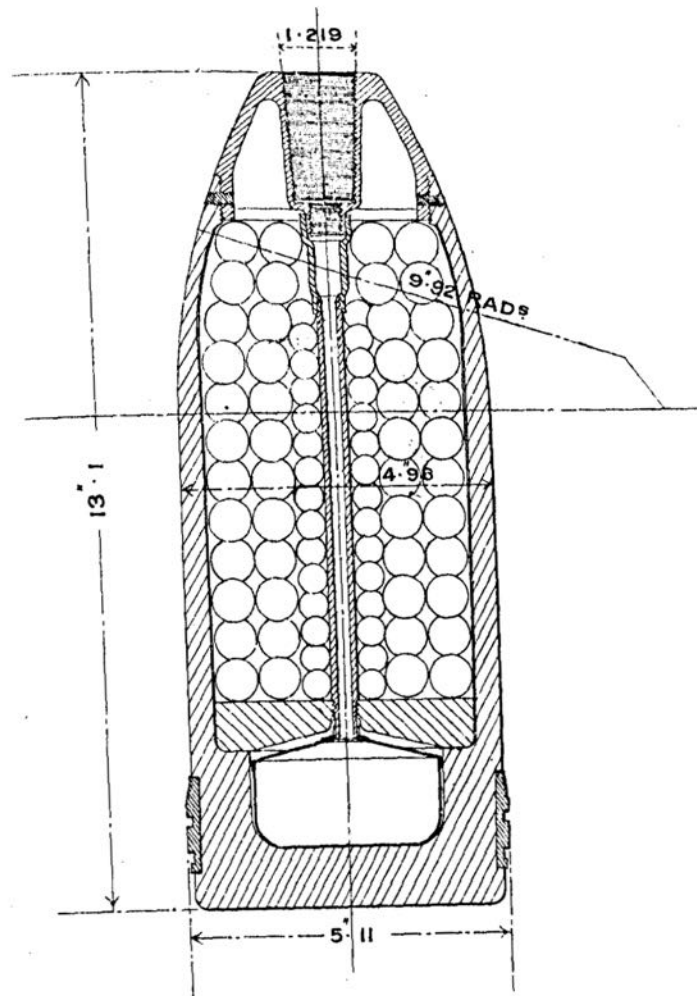
— SCALE $\frac{1}{3}$. —



SHELL, B.L., SHRAPNEL, 5-INCH, HOWITZER, MARK I.

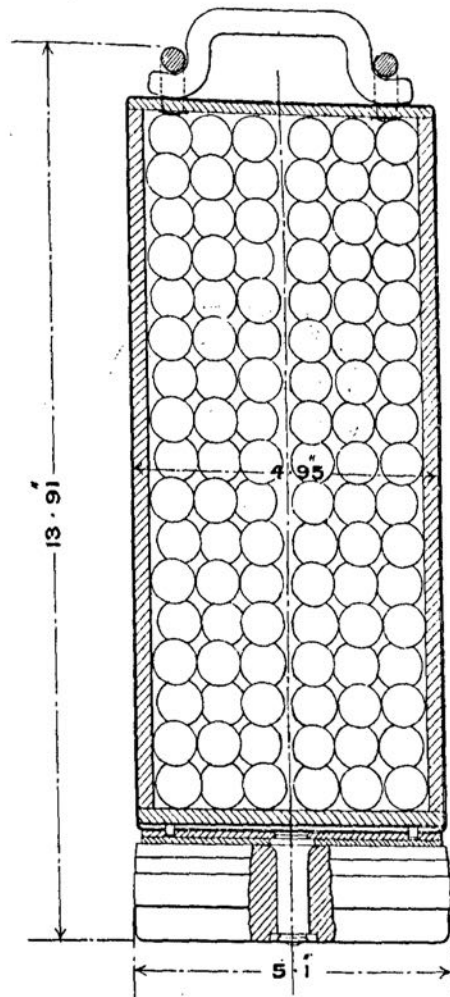
FORGED STEEL.

SCALE $\frac{1}{3}$.



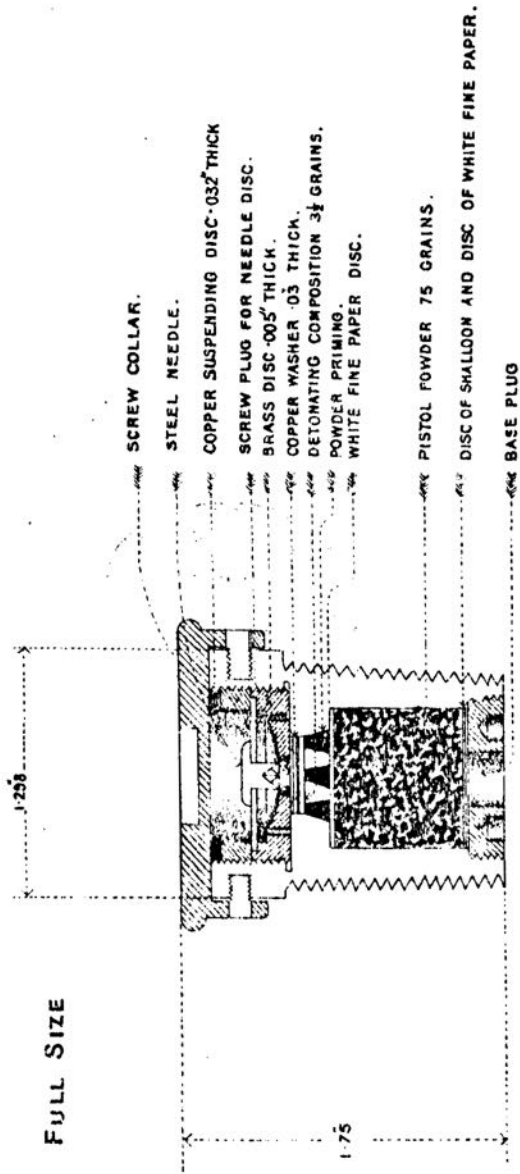
SHOT, B.L., CASE, 5-INCH, HOWITZER, MARK I.

SCALE $\frac{1}{3}$.



FUZE, PERCUSSION, DIRECT-ACTION, NO 3, MARK II.

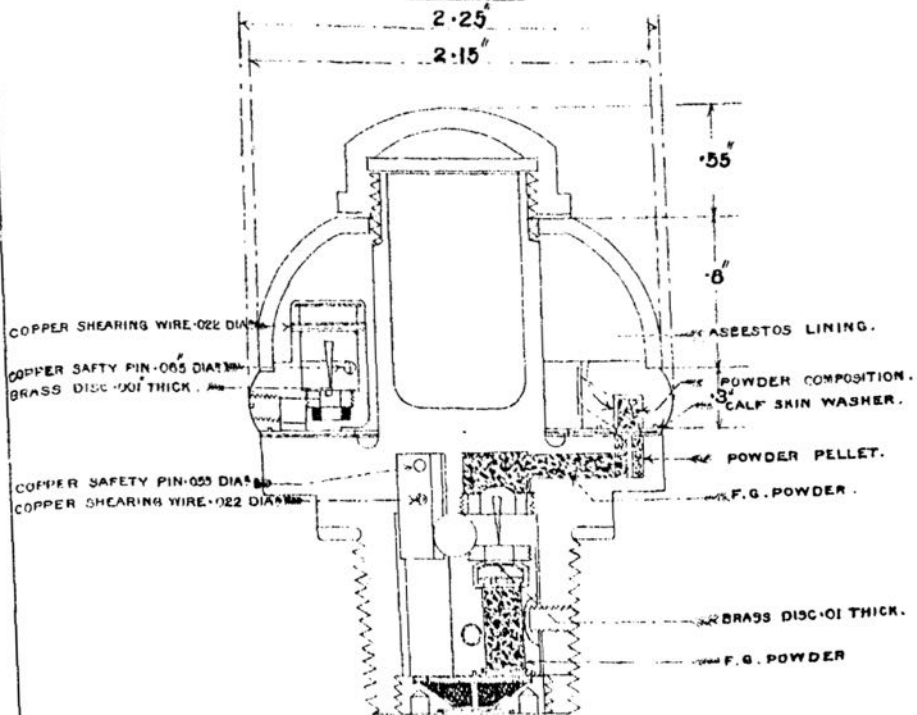
METAL; 5 IN A TIN CYLINDER.



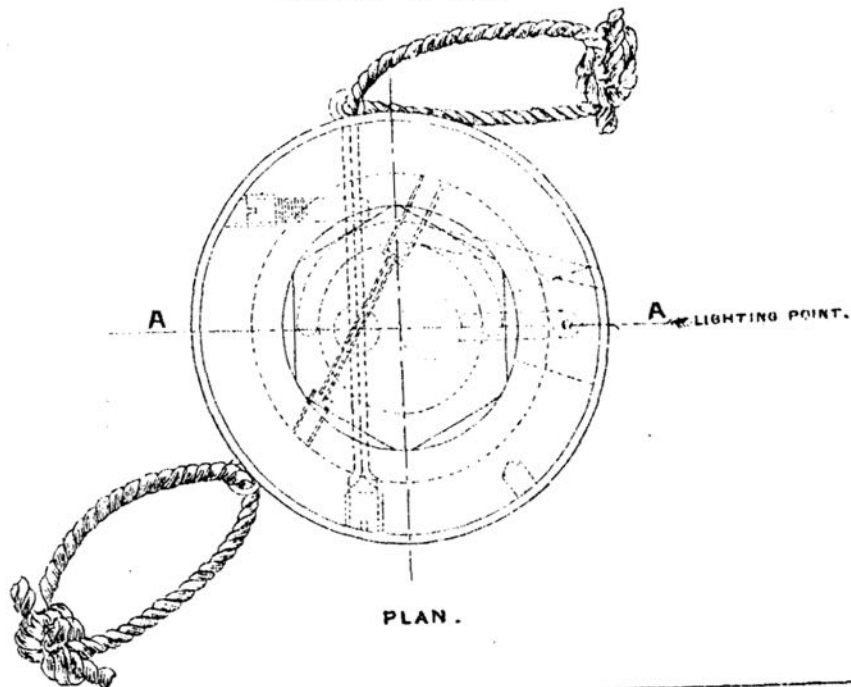
FUZE, TIME AND PERCUSSION, MIDDLE, N° 54, MARK II

METAL; I IN A TIN CYLINDER.

Full Size.

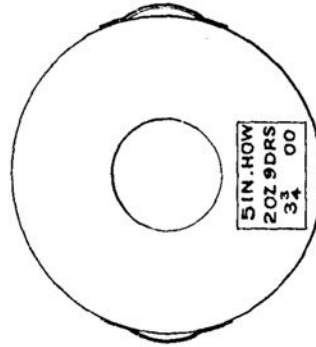
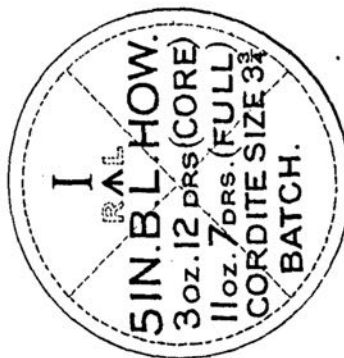
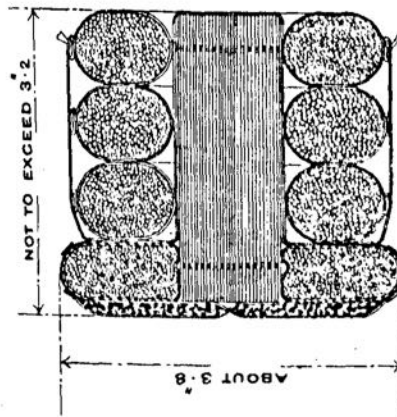


SECTION AT A.A.



CARTRIDGE, B. L. 5 INCH, HOWITZER, CORDITE, 11 7/16 OZ., SIZE 3 3/4, MARK I.

SCALE 1/2.



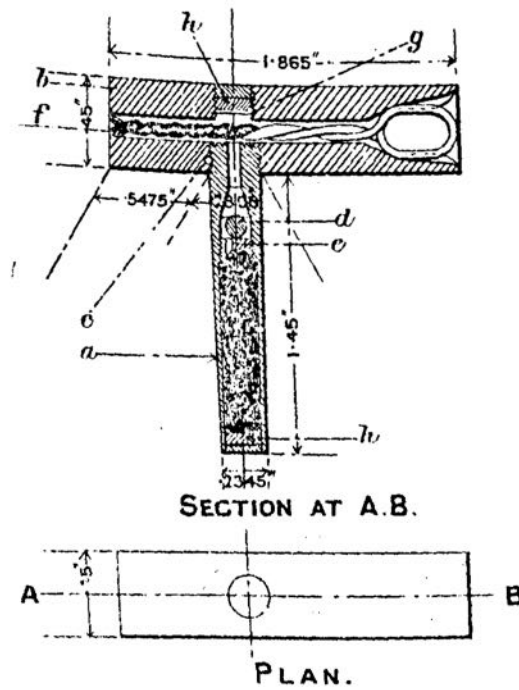
END VIEW OF RINGS.

SECTION.

END VIEW OF BASE.

TUBE, FRICTION, T, MARK I.

Full size.



TUBE, FRICTION, T, DRILL, MARK I.

Full Size.

